

Frontal Lobe deficits and Anger as violence risk markers for males with Major Mental Illness in a High Secure Hospital



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Anne-Marie O'Hanlon, MSc; BSc.

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Portfolio Abstract

Prediction of violent recidivism is an essential component of forensic in-patient assessment and treatment. The significant impact of violent recidivism upon individual victims, families and our wider society is clear. In addition, high numbers of re-admission, coupled with potential for prolonged periods of detention following revision of the Mental Health Act, present high financial costs to already limited High Secure services.

With unacceptable levels of post discharge violent crime reported, increasing demand is seen for the identification of valid and reliable violence risk markers. However, recent violence risk research appears to have moved towards community follow-up studies, which hold limited utility for improvement of in-patient assessment and treatment. As such, this study set out to conduct violence risk marker research with males with Major Mental Illness in a High Secure hospital. Consideration of the existing violence risk marker research revealed positive yet inconsistent findings with regard to anger and neglect surrounding the study of frontal lobe deficits.

The utility of two measures of frontal lobe ability, specifically related to reasoning and decision-making, in addition to anger expression and control, were investigated as violence risk markers for patients with Major Mental Illness. 39 male adult in-patients were assessed using the Wisconsin Card Sorting Test (WCST), the Iowa Gambling Task (IGT) and the second edition of the State-Trait Anger Expression Inventory (STAXI-2). Finally, participants' scores on the Violence Risk Scale (VRS) were used to quantify predicted risk of violent recidivism. It was hypothesised that poorer performance on the frontal lobe measures, higher anger expression index scores and lower anger control scores, would be associated with higher violence risk scores. In addition, it was hypothesised that poorer performance on the frontal lobe measures would be associated with poorer outward anger control. Finally, it was hypothesised that these frontal lobe and anger variables would be found to be significant predictors of violence risk score.

Correlational analysis revealed that the Anger Control-Out and Anger Expression indices from the STAXI-2, as well as WCST total score, significantly correlated with Violence Risk Scale score in the hypothesised directions. Following linear multiple regression, WCST total score and the Anger Control-Out index score were found to significantly and independently contribute to the subsequent Violence Risk Scale predictive model [$F(2, 36)=8.175, p <.01$].

Discussion embeds these findings within the context of previous literature. Strengths and limitations of this study are discussed, as well as suggestions made for future research directions. Recommendations are made for new frontal lobe screening procedures, as well as the modification or refinement of existent treatments.

Finally, an extended paper is presented in complement to the journal paper. This contains additional information relating to the research context which was beyond the scope of the journal paper. Extended methodological factors are addressed, with additional findings provided. This extended paper concludes with further discussion offered and a reflective commentary drawing focus upon the research process. Examples of materials used within the study and evidence of ethical approval can be found within the appendices of this portfolio.

Statement of Contribution

The researcher (primary author) contributed to the following aspects of this research:

Project Design

Application for Ethical Approval

Production of the literature review

Participant Recruitment

Data Collection

Scoring of assessments

Generation of the data set

Data analysis

Production of the journal and extended papers

Dr Louise Braham, clinical supervisor to the researcher, assisted with project design and has provided feedback on written components of this thesis.

Systematic Review

This systematic review was conducted in order to assess the extent and quality of current research evidence surrounding the relationship between anger experience and community violence within high risk populations. Although the examination of frontal lobe deficits was also of interest within this thesis, insufficient research papers were available to produce a systematic review which also incorporated frontal lobe deficits.

Anger experience and community violence in high-risk populations

Abstract

This systematic review investigated the relationship between anger experience and violence committed within the community setting. Such research has considerable implications for treatment and risk prediction for violent individuals, which can have positive impact at both societal and individual levels through the reduction of violent crime. A systematic review of the literature was conducted using keywords pertaining to the affective experience of anger and violent behaviour, according to specific definitions of each outlined within this paper. The databases; PsycINFO, MEDLINE, Academic Search Elite, Web of Science accessed through Web of Knowledge and CINAHL were searched as well as efforts to obtain unpublished resources through personal communications as well as review of prominent violence risk projects and databases. Seven quantitative studies were retrieved through this process, two being potentially related and thus treated as so. Despite this small number of studies, indicative of the poor conceptualisation within the anger and violence research domains, some significant findings were identified. In conclusion, it would appear that a relationship between anger and violence does exist, being strongest when proximal assessments are conducted. These findings although inconclusive, evidence the need for further investigation of this link.

Keywords: anger, violence, violence risk, violent risk, violent reoffending, violent recidivism

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Introduction

Violence

Violent crime has, for many years, been a persistent worldwide societal problem. Its impact is pervasive, resulting in significant harm to victims, their families and the wider society in terms of fear (Home Office, 2008). However, the incidence of violent crime, particularly with violence-related deaths being reportedly two to three times higher in some countries (Krug, Dahlberg, Mercy, Zwi & Lozano, 2002), is much harder to discern.

Within European countries, police national statistics recorded a three per cent average annual rise in violent crime between 1998 and 2007 (Tavares & Thomas, 2009). Such records document that in 2004, England and Wales had the highest rates of violent crime of any developed country (International Crime Victimization Survey [ICVS], Van Dijk, Van Kesteren & Smit, 2008).

However it must also be acknowledged that police national statistics, likely underestimate the true incidence of violence, due to factors pertaining to political sensitivity, reliance on official report and local-level variability in record keeping (Smith, 2006). Difficulties within such studies also arise from the disparate conceptualisation of violent crime. Debate surrounds whether this term should be applied to only instances in which physical injury or psychological distress is discernable, or whether inclusion of all 'offences against the person' is more appropriate (Smith, 2006).

This nosiological variability in violence definition is also paralleled within the psychological literature. Research focuses on a number of often poorly defined concepts. Commonly used terms include 'violence', 'violent behaviour' (Hornsveld, Nijman, Hollin & Kraaimaat, 2007), 'assault' (Swanson, 1994) and 'aggression' (Stanford, Houston, Villemarette-Pitmann & Grove, 2003). To complicate matters, despite the potential for distinction between verbal and physical acts within the concept of 'aggression', this term is frequently used interchangeably with the word 'violence' (Gelles, 1985). An absence in explicit definition of terms, subsequently leads to problems pertaining to replication and generalisation of research.

The violent behaviours which are subject to assessment across the research field vary considerably. Focus between studies differs based upon measurements of verbal or physical violence (Vitacco et al. 2009), as well as violent acts ranging from minor to major severity (Skeem et al. 2006). Heterogeneity may also be seen, as some research solely assesses actions leading to criminal prosecution (e.g. Sreenivasan, Kirkish, Shoptaw, Welsh & Ling, 2000), whilst other authors consider all anti-social behaviours (e.g. Vitacco et al. 2009). Conceptual difficulties arise from the expectation that these varying appraisals equate to the synonymous assessment of 'violence'.

Within this review, the construct of violence was consistent with the definition used within the MacArthur Violence Risk Assessment Study (Monahan & Robbins, 2001); which considered all violent behaviours, not simply those from which criminal convictions amounted. Violence was deemed to constitute:

"... any acts that include battery that resulted in physical injury; sexual assaults; assaultive acts that involve the use of a weapon; or threats made with a weapon in hand" (Monahan & Robbins, 2001).

Violence Risk

In order to reduce the commission of violent behaviour, a key challenge is the identification of specific risk factors for violence. Research evidences that a high proportion of violent crimes are committed by a small sub-group of the population (Skeem, Mulvey, Lidz, Gardner & Schubert, 2002). Investigation of violence risk has been conducted within civil, psychiatric and forensic contexts; however it is the latter two populations which have accrued the most media attention (Ritterfeld & Jin, 2006).

Within these groups, focus has historically centred on assessment and prediction of violence risk within specific diagnostic categories, as defined by the Diagnostic and Statistics Manual of Mental Disorders-Text Revision (DSM-IV-TR, American Psychiatric Association [APA], 2000) or International Classification of Diseases-10 (ICD-10, World Health Organisation [WHO], 1992). This has led to the synonymous assessment of violence in 'high-risk populations', which has for example, included study of patients with schizophrenia (Taylor et al. 2006) as well as those with a diagnosis of Anti-Social Personality Disorder [ASPD] in forensic settings (Howard, Huband, Duggan & Mannion, 2008).

Outcomes of such assessments yielded relatively disparate intra-diagnostic profiles (Filley et al. 2001). This is likely attributable to the erroneous assumption of equally elevated levels of violence risk across these populations; negating appreciation of inter-individual variability. An example of this can be seen upon consideration of the Dangerous and Severe Personality Disorder Programme (DSPD Programme, 2004). Admission criteria for such units stipulate that an individual should be 'dangerous', which is operationalized as, 'more likely to commit an offence that would cause harm to another than not'. However, not all patients retained on such units, particularly those within the hospital setting, have necessarily engaged in previous violent behaviour (Appelbaum, 2005).

In such cases, the assumption of equal high-risk of violence within such heterogeneous populations, conflicts with Hall's (1987) proposal that future violence should never be predicted in the absence of previous violent behaviour; this being the best predictive variable. Binderman (1999) added that negation of historical violence leads to unacceptable levels of false positive predictions of future violence.

Consideration of violence history can also provide insight as to the nature of re-offending, with historically violent offenders being found to be more likely to engage in violent recidivism (Schwaner, 1998). These distinctions are important to maintain, as the risk factors for general criminal behaviour are identified as quite different to those for specifically violent behaviour (Howard, 2009).

However the commission of violent behaviour is not always consistent. Institutional violence, influenced by both personal and situational factors (Gendreau, Goggin & Law, 1997), is found to be unrelated to patterns of violence displayed within the community context (Quanbeck et al, 2007). This variation might arise due to differing violence 'typologies'. Two clear distinctions have emerged within the literature pertaining to violence which is termed 'instrumental' or 'proactive' in nature, being deemed to be goal-oriented (Fontaine, 2007) and that which is defined as 'reactive' or 'impulsive', characterised as affectively driven (Fontaine, 2007). It would therefore seem that at least some violent behaviour could be mediated by emotional dyscontrol. As well as differences between individuals, intra-individual variations in violence risk are also seen with physical aggression being most common in childhood, replaced by verbal aggression in adulthood (Vigil i Colet, Morales-Vives & Tous,

2008). Factors such as these all have clear implications for the assessment and prediction of violence risk.

Violence Risk Measurement

Accurate violence risk appraisal and prediction are areas of significant importance. With regard to containment of violent offenders, attention is drawn to the considerable financial impact of long-term incarceration in “low volume, high-cost secure services” (Davies, Clarke, Hollin & Duggan, 2007, p.70). Post-discharge analysis has further revealed high levels of patient re-admission, as well as violent recidivism which rarely results in reconviction (Davies et al. 2007). Such findings signify the sustained financial implications for community resources pertaining to on-going treatment and supervision, as well as the potential for re-emerging personal costs, through re-perpetration of violent crime.

Historically risk assessment has been based upon actuarial tools reviewing static factors (Skeem & Mulvey, 2002), which have been found to be strongly predictive of future violence (Menzies & Webster, 1995). However, despite their ability to distinguish differing levels of violent risk between individuals, such measures have been criticised for their failure to track an individual’s variation in risk over time (Kraemer et al. 1999). This led to identification of dynamic factors, measuring intra-individual variability or risk state (Skeem & Mulvey, 2002). Such factors are considered predictive of shorter-term risk, related to violence and sensitive to change (Andrews, Dowden & Gendreau, 2009). Focus upon dynamic variables also led to a movement away from diagnostic-led appraisals of violence risk. Instead attention was drawn to investigation of self-reported experiences (Bentall, 2005) and symptoms, as potential violence risk markers (Elbogen & Johnson, 2009). One such affective experience, receiving renewed literary interest, is anger (Potegal & Stemmler, 2010).

Anger

Anger is a conceptually convoluted emotion, making its investigation with regard to violence complex. Literary confusion has arisen from the disparate nature in which anger is defined. Whilst some researchers consider it to be a unitary construct, referring to affective (anger), cognitive (hostility) and behavioural (aggression) components interchangeably (Eckhardt, Norlander & Deffenbacher, 2004); others view these, as distinct units for individual analysis (Spielberger, Sydeman, Owen & Marsh, 1999).

Activation of anger's, cognitive, affective and behavioural systems, is believed to draw a myriad of dichotomous responses. Whilst anger can elicit 'appropriate' rational problem-solving, it can also drive 'inappropriate' irrational thinking (Ellis & Dryden, 1987). Similarly, affective distinctions pertain to its experience as either a positive or negative emotion (Potegal & Stemmler, 2010), which can operate as an enduring aspect of an individual [trait], or a reactive change to personal or environmental circumstances [state] (Lindsay et al. 2004). Finally, specific behavioural consequences are characterised by anger's ability to action "alertness, strength and confidence" (Novaco, 2010), or increase risk-taking (Litvak, Lerner, Tiedens & Shonk, 2010).

Within this paper, the term anger is used to refer to an affective experience which varies from "mild irritation to intense rage" (Spielberger et al. 1999). In accordance with Lindsay et al. (2004), this review also acknowledges further delineation, in terms of anger's stable (trait) and acute (state) presentations. Literature pertaining to the self-reported experience of anger thus forms the focus of this review.

Anger and Violence

Anger is an emotion that has historically been characterised as one of the most destructive; primarily due to the potential of angry individuals to cause harm to themselves or others (Conger, Neppl, Kim & Scaramella, 2003). A heightened propensity to experience anger has been linked to violent behaviour (Novaco & Taylor, 2008) and anger management programmes are frequently employed to improve anger control in attempts to reduce violent offending (Howells et al. 2002).

Some authors propose that although not sufficient, anger is necessary for both development of hostile attitudes and “manifestation of aggressive behaviour” (Spielberger, 1999, p.20). However in contrast, Hubbard, Romano, McAuliffe & Morrow, (2010) argue that aggression can arise in a “proactive” form, in the absence of anger experience.

With positive correlations between anger and violent recidivism being found within, for example, forensic patients with learning disabilities (Lindsay et al. 2004); its identification as a predictor variable of violent risk (Wang & Diamond, 1999) seems unsurprising. Whilst correlations are not always large, they have been found to be equivalent to other violence risk markers, such as psychopathy (Douglas & Webster, 1999). These preliminary findings and contrasting viewpoints within the areas of anger and violence emphasise the need for this systematic review of the evidence base.

Aims

The aims of the present paper were to conduct a systematic review of the available literature investigating the link between anger experience and violence committed in the community context, within discernably violent populations.

Consultation of both the Campbell Library and Cochrane database of systematic reviews revealed that this is not the first review of violent behaviour. However previous reviews having focussed upon institutional violence, partner violence or sexual violence, discern this review, as the first systematic review pertaining to anger and its relation to community-based violence.

Review Question

What is the nature of the relationship between anger experience and community violence?

Methodology

Inclusion and Exclusion Search Criteria

The following table evidences the criteria that were utilised to ascertain whether a research study was suitable for inclusion within this review.

Table 1: Inclusion/ exclusion criteria

Criterion	Rationale
No restrictions were placed upon when a piece of research was conducted.	This was in order to elicit the most comprehensive review of the literature to date. However it was acknowledged that restrictions are inherent to some databases and as such, the necessity for these details to be explicitly stated was recognised.
Only research for which translation in the English language was available was considered for inclusion within this review.	This was reflective of the linguistic abilities of the reviewer and time constraints upon this paper. It was also in consideration of the difficulties that can be inherent to translation of research, particularly pertinent to areas such as anger and violence, which experience the interchangeable use of terminology. Caution was also taken when considering the inclusion of research arising from countries evidencing markedly different violent crime rate; as violence-related deaths are reported to be two to three times higher in some countries (Krug, Dahlberg, Mercy, Zwi & Lozano, 2002). This being attributed to use of amphetamine-like substances (Gelaye, Philpart, Goshu, Berhane, Fitzpatrick & Williams, 2009).

Table 1 continued:

Criterion	Rationale
Only research which had undergone the peer-review process was assessed for inclusion within this paper.	This reflects the purpose of a systematic review, namely to provide a synthesis of previous high quality research within the field of investigation. The peer review process was considered by the reviewer to be an effective marker of research quality.
Both published and unpublished research was considered for inclusion within this review.	This was to ensure that all relevant research where possible, whether unpublished, pending publication or published, was reviewed. However, consistent with the previous criterion, only research which had undergone the peer-review process was considered.
Only research in which the identification or measurement of anger could be reliably discerned was included within this review.	This was reflective of the heterogeneity of anger conceptualisation and synonymous use of terminology (Eckhardt, Norlander & Deffenbacher, 2004). This did not signify omission of research with subsequent recognition of anger as well as anger assessed within a multi-componential analysis of anger, hostility and aggression or within broader inventories (e.g. Aggression Questionnaire, Buss & Perry, 1992). Caution was also taken over studies pertaining to attribution of offender motivations, arising solely from historical collateral review. Myers, Husted, Safarik and Toole (2006) argued that authors can misattribute anger as the motivation underlying all aggressive or violent acts, thus failing to appreciate violent behaviour committed in the absence of angry affect.

Table 1 continued

Criterion	Rationale
<p>Only studies in which violence perpetrated against another was discernable and verifiable were considered for inclusion in this review.</p>	<p>As the review focus was upon inter-personal violence, this criterion was deemed necessary to distinguish harm to another, from acts of self-harm. This review considered any act of violent behaviour perpetrated against another individual, with the minimum 'violence' threshold being in line with that outline by the MacArthur Violence Risk Assessment study, namely, 'threats made with a weapon in hand' (Monahan & Robbins, 2001). The verifiable aspect of the criterion pertained to official records, documents or self-reports that could be verified. This criterion further omitted studies pertaining to the assessment of non-violent criminal behaviour (e.g. theft). This was necessary due to the acknowledgement that different risk factors underlie these differing typologies of crime (Howard, 2009).</p>
<p>Studies inferring risk of violence based solely on psychiatric diagnosis were not considered for inclusion within this review.</p>	<p>This reflected the fact that some assessments of anger are conducted in 'violent' or 'dangerous' populations, such classifications arising from clinical diagnosis rather than actual behaviour. Research such as this can elicit study of anger within diagnostic groups with a mix of non-violent and violent histories, with neither differences in anger nor violence being discernable between such participants. It is cautioned that prediction of future violence in the absence of a violent history, can lead to elevated levels of false positive predictions (Binderman, 1999).</p>

Table 1 continued

Criterion	Rationale
Only those studies assessing violence committed within the community context were considered for inclusion within this review.	This was reflective of the distinction between institutional and community violence (e.g. Fulham & Dolan, 2008). Research has identified that community violence is not predictive of institutional violence (Dinakar & Sobel, 2001), these being deemed to be unrelated. It is acknowledged that the institutional context in particular, is greatly influenced by situational, as well as individual factors (Toch, 1985).
Studies pertaining solely to the assessment of violence within the domestic and familial contexts were not considered for inclusion within this review.	This is due to the fact that violence committed within the domestic and familial contexts are viewed to have differing risk factors. These can relate to situational and attitudinal factors, which can be both individually and culturally influenced (Smith Slep & O'Leary, 2007). Studies investigating anger experience with regard to differing typologies of violence were considered for inclusion within this review in cases in which outcomes for these different participant groups were clearly discernable.
No restrictions were placed upon studies with regard to methodological typology.	This reflected the methodological diversity seen in the psychological research field, particularly within mental health and forensic contexts. However, due to review's focus upon anger experience and its association with violent behaviour, both of which were required to be present, discernable and reported, it was acknowledged that such factors would more commonly be identifiable in quantitative and mixed-methods research.

Table 1 continued

Criterion	Rationale
Duplicate publications of research results arising from the same population or dataset were not treated as separate studies within this review.	This was to prevent elevating positive or negative findings arising from a single dataset, which could ultimately skew outcomes of the review.
Only research which has predominant focus upon individuals over the age of 18 was considered for inclusion within this review.	This is in reflection of the fact that cognitive control of emotions such as anger, has been evidenced to develop over childhood and adolescent years (Deater-Deckard & Mullineaux, 2010). Those under 16 further experience less autonomy pertaining to factors such as education and residency. Therefore violent behaviour committed within such arenas, might also be viewed as highly influenced by situational variables. Moreover, behaviour has also been shown to vary dependent upon age, with physical aggression being more prominent in younger years, shifting to verbal aggression in adulthood (Vigil i Colet, Morales-Viles & Tocus, 2008). Research that includes, but does not exclusively focus upon individuals aged 16-18, was considered for inclusion within this review.
Research regarding anger-focussed treatments, as well as that pertaining to development/ trial of an anger or violence risk assessment tool, were considered for inclusion within this review.	This was due to the fact that pre and post-intervention behavioural and emotional changes, evidenced in recurrently violent individuals, could provide relevant insight into this area. Research pertaining to anger or violence risk assessment tool development was only considered for inclusion if the construct under measurement was clearly defined and operationalized.

Table 1 continued

Criterion	Rationale
Research pertaining to the study of populations within which cognitive or communication deficits are deemed to be central to elevated violence, were not considered for inclusion within this review.	This was due to the fact that some patients evidence emotional and behavioural dyscontrol which might be a direct result of organic cognitive deficits, difficulties in communication or traumatic brain injuries. Violent behaviours which might occur in such groups were viewed as distinct and outside of the focus of this review.

These inclusion and exclusion criteria will be applied at every stage during the screening process as follows;

Electronic Pilot Searches

The PsycINFO database, one of the primary databases for psychological sciences, was used to run pilot searches to assess the viability of the inclusion/exclusion criteria, as well as for the identification of appropriate key words. The first group of searches were conducted using the terms; rage, ang*, anger, angry temperament, trait anger, anger experience and anger control. All terms identified by PsycINFO as mapping to the subject heading were subsequently combined using the selection 'OR' and auto-exploded. The same process was used to conduct a second group of pilot searches using the keyword terms; agg*, aggression, assault, violence, violent, violence risk, violent behaviour, violent reoffending and violent recidivism.

Within each of these searches, the first ten articles identified as relevant to investigation of anger and violence risk, corresponding to the definitions of each, operationalized within this review, were subsequently selected. The inclusion/ exclusion criteria were applied in order to ascertain whether they could be reliably interpreted. Journals identified as relevant following the application of the inclusion/ exclusion criteria, were then reviewed for keyword terms to ensure none had been missed. The term 'anger' was common to each relevant article identified through the initial pilot searches and thus deemed appropriate for use as a distinct key-word. Similarly, studies relating to aggression and assault, when pertaining to physical acts rather than verbal, also included key-word terms such as 'violence' or 'violent', therefore focus was refined around these terms.

Keyword Searches

Using advanced searching tools, the keyword terms, anger, violent risk, violence risk, violent recidivism and violent re-offending were entered into the following databases; PsycINFO, MEDLINE, Academic Search Elite, Web of Science accessed through Web of Knowledge and CINAHL.

Mapped terms, identified by some of these databases (see tables), were assessed for relevancy with consideration of inclusion/ exclusion criteria. Those deemed appropriate by the reviewer were then combined with the subject heading using the 'OR' combination and were auto-exploded.

Combination Searches

The final searches were conducted; anger being combined with the four violence terms through use of the 'AND' function. Each article title arising within these search results was scanned with the inclusion/ exclusion criteria being applied. The abstracts of papers, whose titles appeared relevant, were then accessed and reviewed. If still appearing relevant, a full text version of the article was obtained and final screening for inclusion was conducted. This search strategy is reflected in Tables 2-11.

Database 1: PsycINFO (1806-August 2010)

Consistent with the focus of the review and its inclusion/ exclusion criteria, the following database limits were applied: Human, Adult, Peer-review journal, Disordered populations and English Language.

Table 2: PsycINFO Key word searches

Keyword search term	Results	Results with Limiters Imposed	Combined selections with 'OR' and auto-exploded
Anger	21520	4029	Anger; Anger control; Anger as a keyword
Violent risk	231480	121729	Recidivism; Psychiatric patients; Aggressive behaviour; Prisoners; Violent risk as a keyword
Violence risk	671004	374390	Risk factors; Forensic evaluation; Psychiatric patients; Violent crime; Mental disorders; Violence risk as a keyword
Violent recidivism	102420	29000	Male criminals, Anti-Social Personality Disorder; Risk factors; Violent recidivism as a keyword
Violent reoffending	404130	96018	Mentally Ill Offenders; Personality Disorders; Violent crime; Mental health; Forensic psychiatry; Risk factors, Violent reoffending as a keyword.

Table 3: PsycINFO Combined searches

Combined Selection Searches	Results
Anger and Violent risk	528
Anger and Violence risk	918
Anger and violent recidivism	139
Anger and violent reoffending	374

Database 2: MEDLINE (OVID 1950-August 2010)

Consistent with the focus of the review and its inclusion/ exclusion criteria, the following database limits were applied: Reviewed, English and Adulthood.

Table 4: MEDLINE Keyword searches

Keyword search term	Results	Results with Limiters Imposed	Combined selections with 'OR' and auto-exploded
Anger	9326	169	Anger; Anger as a keyword
Violent risk	3703428	249690	Mental disorders; Violence; Adult; Forensic psychiatry; Risk factors; Violence risk as a keyword
Violence risk	3706618	106518	Mental disorders; Violence, Adult; Risk factors; Violent risk as a keyword
Violent recidivism	3619755	133870	Mental disorders; Violence; Crime; Anti-Social Personality Disorder; Adult; Recurrence; Risk assessment; Forensic psychiatry; Violent recidivism as a keyword
Violent reoffending	152683	100060	Mental disorder; Violence; Crime; Adult; Recurrence; Risk assessment; Criminals, Violent reoffending

Table 5: MEDLINE Combined searches

Combined Selection Searches	Results
Anger and Violent Risk	122
Anger and Violence Risk	105
Anger and Violent Recidivism	133
Anger and Violent Reoffending	112

Database 3: Academic Search Elite (1985-2010)

Consistent with the focus of the review and its inclusion/ exclusion criteria, the following database limits were applied: Peer-review; Adult and Human.

Table 6: Academic Search Elite Keyword Searches

Keyword search term	Results	Results with Limiters Imposed
Anger	16692	3527
Violent risk	107	10
Violence risk	625	601
Violent recidivism	64	47
Violent reoffending	8	8

Table 7: Academic Search Elite Combined Searches

Combined Selection Searches	Results
Anger and Violent Risk	0
Anger and Violence Risk	6
Anger and Violent Recidivism	0
Anger and Violent Reoffending	0

Database 4: Web of Knowledge (Web of Science, 1985-2010)

Consistent with the focus of the review and its inclusion/ exclusion criteria, searches were conducted within the subject areas: Psychiatry, Psychology, Clinical Psychology and Criminology, with database limits including English Language and Review.

Table 8: Web of Knowledge Keyword Searches

Keyword search term	Results	Results with Limiters Imposed
Anger	12194	164
Violent risk	3207	3194
Violence risk	8486	8437
Violent recidivism	657	653
Violent reoffending	68	68

Table 9: Web of Knowledge Combined Searches

Combined Selection Searches	Results
Anger and Violent Risk	0
Anger and Violence Risk	7
Anger and Violent Recidivism	1
Anger and Violent Reoffending	9

Database 5: CINAHL

Consistent with the focus of the review and its inclusion/ exclusion criteria, the following database limits were applied: Journal article and Adult (19+).

Table 10: CINAHL Keyword searches

Keyword search term	Results	Results with Limiters Imposed
Anger	3610	761
Violent risk	52	16
Violence risk	794	171
Violent recidivism	17	11
Violent reoffending	4	3

Table 11: CINAHL combined searches

Combined Selection Searches	Results
Anger and Violent Risk	2
Anger and Violence Risk	16
Anger and Violent Recidivism	45
Anger and Violent Reoffending	0

Searching Other Resources

The reference list of each study selected for inclusion within this review was scanned using the inclusion/ exclusion criteria applied within the electronic searches. Those studies deemed to be potentially appropriate for inclusion were identified by title, abstracts were then reviewed and full-text versions obtained where appropriate. This enabled identification of any papers potentially missed by the electronic review process.

Due to its well-publicised investigation of violence risk assessment, the MacArthur Research Network website (<http://www.macarthur.virginia.edu/risk.html>) was also screened for unpublished peer-reviewed research. Further to this, personal communication was made with all first authors of those studies included, in order to enquire about the existence of relevant unpublished peer-reviewed research in the area. Collectively, these review processes elicited selections and exclusions akin to the following examples:

Table 12: Examples of included and excluded research

Study included	Study excluded
Mills, J.F. & Kroner, D.G. (2003). Anger as a Predictor of Institutional Misconduct and Recidivism in a Sample of Violent Offenders. <i>Journal of Interpersonal Violence</i> , 18, 282-294. Rationale for inclusion: Directly measured anger and post-release violent behaviours.	Fassino, S; Amianto, F; Gastaldo, L & Leombruni, P. (2009). Anger and functioning amongst inpatients with schizophrenia or schizoaffective disorder living in a therapeutic community. <i>Psychiatry and Clinical Neurosciences</i> , 63, 186-194. Rationale for exclusion: Measures in-patient violence rather than community violence.

Near Misses

In cases in which insufficient information was available in order to make a clear decision upon inclusion or exclusion, the authors of the paper were contacted and given two weeks to respond to the enquiry. If no response was received in this time, the paper was either omitted or included with caution as shown in the examples in Table 13.

Table 13: Examples of a near miss and cautious inclusions

Near miss	Studies included with caution
Howard, Huband, Duggan & Mannion (2008). Exploring the link between personality disorder and criminality in a community sample. <i>Journal of Personality Disorders</i> , 22 (6), 589- 603.	Loza and Loza-Fanous (1999). Anger and prediction of violent and non-violent offenders' recidivism. <i>Journal of Interpersonal Violence</i> , 14, 1014-1029. Loza and Loza-Fanous (1999). The Fallacy of reducing rape and violent recidivism by treating anger. <i>International Journal of Offender Therapy and Comparative Criminology</i> , 43, 492-502.
Rationale for exclusion: Anger assessed in a community sample with mixed violent and non-violent histories. The APD/BPD group did evidence significantly higher trait anger and anger expression-out as well as significantly lower anger control, when compared with the rest of the sample. This group was also significantly 'more likely' to have a violent conviction, however the APD/BPD group evidenced a combination of violent and non-violent histories and violent individuals could not be discerned or their anger scores independently assessed.	Rationale for inclusion: Although authors, country, nature of participants (incarcerated offenders) and publication year are the same, as well as both publications using similar assessment tools, the sample sizes in the studies do differ. However, the use of an overlapping population, which would have led to exclusion, could not be confidently confirmed.

Results

From the systematic searches, seven studies were deemed to meet criteria for inclusion within this review, all of which were published articles. Efforts had been made to ascertain studies awaiting publication in a bid to minimise bias, which might arise from publication of significant findings. However due to the disparity in outcomes, such bias seems unlikely to arise from the papers selected for inclusion.

Two of these studies (Maiuro et al. 1988; Skeem et al. 2006) included assessment tools, Buss-Durkee Hostility Inventory (BDHI, Buss & Durkee, 1957) and Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983) respectively, that were developed for the measurement of hostility. The authors of these papers rejected this statement, stating that based upon conceptual grounds, it was actually the construct of anger being measured. For ease of narrative, from hereon in, these components of analysis will be referred to as 'anger measurements' and the construct being measured, as 'anger'.

Method of data Abstraction

A coding protocol was developed in order to extract the relevant information from each study in preparation for synthesised analysis. This included identification features of the study pertaining to authors, date of publication and the originating country of the research. In addition, study characteristics and key findings were abstracted. Similarly, due to the heterogeneity of terminology within the anger and violence research, studies were screened for the definition of the constructs subject to investigation.

Methodological features were also of interest. Participant characteristics pertaining to; numbers, gender, age and the presence of control groups as well as any other demographic details or matching criteria were extracted where available. Anger and community violence assessment methods were also abstracted, as well as whether a rationale for selection of assessment tools was evident. Not all of this information was ascertainable from every study, however related articles were consulted if it was indicated that any of this information was reported elsewhere.

Table 14: Methodological data

Feature	Study 1	Study 2a	Study 2b	Study 3	Study 4	Study 5	Study 6
Violence definition given	Y	Y	Y	Y	N	Y	Y
Conceptual clarity with regard to anger	N	N	N	Y	N	N	N (symptom cluster investigation)
Rationale given for choice of assessments	N	N	N	Y	N	N	Y
Inclusion/Exclusion criteria defined	Y	Y	Y	N	N	Y	Y
Control Group	Y	Y	Y	N	Y	N	N
Matched Control Group	Age, race, marital status and Socio-economic status (SES)	N	N	N/A	Age	N/A	N/A

Table Identifiers

N: No

Y: Yes

N/A: Not-applicable

Table 15: General Characteristics of Presented Studies

Study Number	Study Identification	Participants	Anger Measure	Community Violence Measure
1	Maiuro, Cahn, Vitaliano, Wagner & Zegree (1988) U.S	<ul style="list-style-type: none"> 129 male community patients, divided into three groups; Domestically violent (39) General assaulters (29) Mixed assaulters (38) (referred for anger treatment) Non-violent dental patients (29) 	BDHI ¹	Previous violence ascertained from documented assault histories (police and victim reports, rap sheets or affidavits) and clinical interview
2a	Loza & Loza-Fanous (1999) Canada	<ul style="list-style-type: none"> 252 Incarcerated male offenders, divided into two groups 115 violent 137 non-violent 	NAS ² – Parts A & B BPAQ ³ SAQAN ⁴	Violent pre-convictions Risk measures: Clinical risk variables (age, number of past offences/ violent offences) LSIR ⁵ ; GSIR ⁶ ; PCL-R ⁷ ; VRAG ⁸

¹ Buss-Durkee Hostility Inventory (BDHI, Buss & Durkee, 1957)

² Novaco Anger Scale - Parts A and B (NAS; Novaco, 1994)

³ Buss-Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992)

⁴ The Self-Appraisal Questionnaire Anger Sub-scale (SAQAN, Loza, 1996)

⁵ Level of Supervision Inventory-Revised (Andrews & Bonta, 1995)

⁶ General Statistical Information in Recidivism (GSIR, Nuffield, 1982)

⁷ Psychopathy Checklist Revised (PCL-R, Hare, 1991)

⁸ Violent Risk Appraisal Guide (VRAG, Harris, Rice & Quinsey, 1993)

Table 15 continued

Study Number	Study Identification	Participants	Anger Measure	Community Violence Measure
2b	Loza & Loza-Fanous (1999) Canada	<ul style="list-style-type: none"> • 271 Incarcerated male offenders • Violent (169) • Non-violent (42) 	NAS Parts A & B BPAQ STAXI ⁹ SAQ ¹⁰	Previous violence: Severity assessed using classification defined by Correctional service of Canada Violent offender group- at least one major (e.g. murder, manslaughter, assault, kidnap, forcible confinement) or serious (e.g. robbery with violence or sexual offences) violent pre-conviction Non-violent group – convictions deemed moderate (e.g. fraud and non-violent criminal acts) or minor (e.g. property offences).

⁹ State-Trait Anger Expression Inventory (STAXI, Spielberger, 1988)

¹⁰ The Self-Appraisal Questionnaire (Loza, 1996)

Table 15 continued

Study Number	Study Identification	Participants	Anger Measure	Community Violence Measure
3	Mills & Kroner (2003) Canada	<ul style="list-style-type: none"> • Offenders in custody • Male (48%) and Female (52%) 	NAS STAXI BPAQ	Historical violence: Prior convictions for assault
4	Stanford, Houston, Villemarette-Pitmann & Greve (2003) U.S	<ul style="list-style-type: none"> • Psychiatric Outpatients • 14 premeditated aggressors • 14 non-aggressive controls • (12 males, 2 females per group) 	BPAQ	BPAQ
5	Skeem, Odgers, Gardner, Schubert, Mulvey & Lidz (2006)	<ul style="list-style-type: none"> • Hospital Psychiatric Emergency Room Patients • 132 patients • Male (48%) Female (52%) 	BSI ¹¹ – Hostility sub-scale Authors state anger	Inclusion criteria: Documented history of violence; recent violence in previous 2 months Weekly corroborated interview of participant using adaptation of the

¹¹ Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983)

U.S

being
measured

Conflict Tactic Scale (Lidz, Mulvey & Gardner, 1993).

Table 15 continued

Study Number	Study Identification	Participants	Anger Measure	Community Violence Measure
6	Doyle & Dolan (2006)	<ul style="list-style-type: none"> 112 discharged hospital (78) and forensic patients (34) Male (67%) Female (33%) 	NAS ¹² cognitive, arousal, behavioural.	Primary Outcome measure: Any community violence officially recorded or self-reported and verified
	U.K			

¹² NAS (Novaco, 2004)

Table 16: Key Findings of Presented Studies

Study Number	Key Findings
1	<p>Upon comparison of the domestically violent, general assault and mixed assault groups, with the non-violent control group significant differences were found between violent and non-violent groups for all sub-scales of the BDHI, except for negativism. Of interest to this paper, this included the hostility sub-scale, deemed by this study's authors to actually represent the measurement of the affective experience of anger. No significant differences found between violent groups on this on the BDHI.</p>
2a	<p>A significant difference in scores on the anger sub-scale of the BPAQ was found when participants were categorised according to three risk levels defined using the PCL-R [$F(2,111) = 4.23, p < 0.01$].</p> <p>Significant differences were found between scores on the NAS behavioural sub-scale [$F(2, 133) = 3.65, p < 0.05$], BPAQ anger sub-scale [$F(2, 130) = 5.94, p < 0.01$] and SAQ anger scale [$F(2, 308) = 4.44, p < 0.01$], when comparison between participants categorised according to three distinct risk levels defined using the VRAG.</p> <p>Upon comparison with clinical risk variables (age, number of past offences and number of violent offences), some anger measures, NAS part A, NAS behavioural-scale, SAQ anger scale and STAXI anger-in subscale, correlated significantly with age to the 0.05 level.</p>
2b	<p>Upon comparison of the violent and non-violent group scores on all anger measures, only one significant difference, for Part A of the NAS, was identified ($p < 0.05$).</p>
3	<p>A significant correlation was found between the STAXI anger-out sub-scale score and number of prior assault convictions ($p < 0.05$). A significant correlation was also found between the behavioural sub-scale of the NAS and number of prior incarcerations ($p < 0.01$), however the typology of these incarcerations was not discernable. Moreover, these associations failed to reach significance when further correlations were run, with impression management being partialled out.</p>

Table 16 continued: Key Findings of presented studies

Study Number	Key Findings
4	<p>Significant differences were found upon comparison of premeditated aggressors with non-aggressive controls on the BPAQ physical aggression [$F(1, 26) = 32.33$, $p < 0.001$] and anger [$F(1,26) = 30.60$, $p < 0.001$] sub-scales.</p> <p>A significant correlation was also found upon comparison of aggressive and non-aggressive mean group scores on the Brown-Goodwin Lifetime History of Aggression scale [$F(1,26) = 36.82$, $p < 0.001$], however, this scale measures aggression within childhood, adolescence and adulthood, therefore combining different typologies of aggression (verbal and physical).</p>
5	<p>Risk status: Participants average hostility score over the 26-week follow-up was significantly related to the number of violent incidents over the same period ($\beta = .56$, $p < 0.001$).</p> <p>Proximal Risk: A significant association was found between participants hostility score and serious violence within the same week.</p> <p>Time-ordered risk: Hostility score in one week was significantly related to serious violence in the following week. Cross-lagged time series structural equation modelling found that the reverse relationship was not significant. Hostility was found to uniquely predict violence in the following week.</p>
6	<p>Significant differences were identified between violent and non-violent groups with regard to NAS cognitive, arousal, behavioural and total scores ($p \leq 0.001$).</p> <p>In addition, the NAS cognitive sub-scale was found to independently predict violence ($p < 0.005$)</p>

Description of Studies

These seven studies were conducted over an 18 year period, all being published resources, with predominant countries of origin being the U.S and Canada. Two studies published by Loza and Loza-Fanous (1999a; 1999b) evidenced similarities pertaining to; country of origin, nature of participant sample, participant demographics (age range; sentence ranges), as well as commonality in assessment methods. As the independence of these studies could not be ascertained, they were treated as 'potential duplications', with associated bias being considered and discussed.

Participant Demographics

There were considerable differences relating to participant recruitment. The average number of violent perpetrators assessed was 104, ranging between studies from 14 (Stanford et al. 2003) to 169 (Loza & Loza-Fanous, 1999b). Despite two of the studies being potentially related, even after removal of the smaller of these sample sizes and subsequent re-calculation, average sample size of the violent groups did not alter.

Four of the seven studies focussed exclusively on male populations, whilst the remaining three investigated mixed gender groups. Of the mixed gender studies only two evidence a relatively even gender split, whilst the other participant groups contained higher numbers of males than females. None of the mixed gender studies presented gender-discernable results.

Three studies drew from forensic populations in custody, whilst two concerned the study of psychiatric out-patients. A further study recruited discharged patients from both forensic and psychiatric contexts, whilst another consisted of a community sample referred following commission of violent behaviour.

Methodological Differences

All seven studies were of quantitative methodological design, having specific and explicitly defined research hypotheses. Due to the inclusion criteria of this review, all studies explored the construct of anger, specifically self-reported anger experience, in high-risk populations, who had a verifiable history of previous violence. However, only one of these studies (Mills & Kroner, 2003) provided the reader with a definition of the construct of anger, making clear the heterogeneity in definition that can often occur within the literature. Again, this study was also the only one which evidenced selection of anger assessment tools based upon theoretical founding. In contrast, when it came to the operationalizing of violence, six of the seven studies gave clear definitions.

All seven studies utilised self-report questionnaire methods for the assessment of anger. A total of six alternative self-report scales were used across the seven studies. Two of these measures were not specific to anger, BDHI (Buss & Durkee, 1957) used in Maurio et al. (1988) and BSI (Derogatis & Melisaratos, 1983) hostility sub-scale within Skeem et al. (2006), were originally designed and developed for the measurement of the quite distinct construct of hostility, this was however refuted upon conceptual grounds by these authors.

Considerably more variation was seen with regard to the manner in which community violence was investigated. Maiuro et al. (1988), Loza and Loza-Fanous (1999b), in addition to Mills and Kroner (2003), measured historical community violence, ascertained via external official records. Loza and Loza-Fanous (1999a) included assessment via documented violence histories, static risk variables and static actuarial tools for violence risk prediction. Alternatively Stanford et al. (2003) used a self-report aggression questionnaire, whilst Skeem et al (2006) used weekly semi-structured interviews with participants as well as another individual capable of corroborating events.

Of the seven studies, five of these included comparative analyses of documented violence histories with current self-report measures of anger. Two of these studies (Loza & Loza-Fanous 1999b; Mills & Kroner, 2003)

used direct comparison of current anger with previous violent convictions, both finding no significant associations.

The remaining three studies (Maurio et al, 1988; Loza & Loza-Fanous, 1999a; Stanford et al. 2003) confirmed the presence of historical violence within their populations, through either previous convictions (Loza & Loza-Fanous, 1999a) or documented assault histories (Maurio et al. 1988; Stanford et al. 2003). Maiuro et al. (1988) and Stanford et al. (2003) used these histories to conduct analysis of anger scores comparative to a non-violent control group. Both studies found significantly higher anger scores within the group with a violent history.

Loza & Loza-Fanous, (1999a) however, used the discernable violent and non-violent histories of their participant group, to synonymously assess the anger scores of the whole sample, relative to differing scores achieved upon four predictive risk tools. Significant differences were found in mean anger scores for some anger measures upon comparison of participants across different risk levels. However, these were only achieved upon two of the four predictive tools (PCL-R, Hare, 1991; VRAG, Harris et al. 1993) and were strongest upon comparison of the highest and lowest risk status groups.

The remaining two studies (Skeem et al. 2006; Doyle & Dolan, 2006) used a longitudinal design, assessing self-reported anger in relation to violence committed at follow-up. Doyle & Dolan (2006) assessed anger at baseline. A six week follow-up of participants led to their separation into non-violent and violent groupings based on their behaviour over the assessment period; with comparative analysis of these two groups revealing significantly higher anger scores for the violent group. Finally, Skeem et al. (2006) conducted assessment of anger and violence on a weekly-basis. Initial assessment revealed that average anger scores over the six month period, strongly related to the number of violent incidents across the same period. Proximal analysis revealed significant correlations between anger scores and number of violent incidents recorded within the same week. Finally, time-ordered analysis revealed that anger scores at one week were significantly correlated to the number of violent incidents

recorded the next week. Use of a Structural Equation Model revealed that this was the only direction in which this relationship reached significance.

Of the seven studies, five used a non-violent control groups for comparison, yet across the studies there was little information pertaining to assessor blinding to group membership. Control groups evidenced considerable variation in sample size, ranging from 14 to 42. Stanford et al. (2003) was the only study with a control group that was matched with regard to number. Maiuro et al. (1988) did evidence matched numbers for controls in comparison to the general assaultive group, however this did not appear purposeful, as their main comparative focus was upon a larger group of domestically violent men. Similarly, only three of the studies provided evidence of matching based upon on factors such as; age (Maiuro et al. 1988; Stanford et al. 2003; Doyle & Dolan, 2006), race (Maiuro et al. 1988; Doyle & Dolan, 2006), marital status, socio-economic status (Maiuro et al. 1988), gender and Personality Disorder diagnosis (Doyle & Dolan, 2006).

Two of the seven studies differentiated between offender typology, with Maiuro et al. (1988) distinguishing between domestically violent, assaultive but non-domestically violent and mixed violent groups, finding no significant differences. Loza and Loza-Fanous (1999b) also drew distinction between sexually violent and non-sexually violent offenders. However, unlike Maiuro et al. (1988), the comparison of these distinct violent typology groups with the non-violent offenders, was not explicitly reported.

Discussion

Findings

After combining the findings of the selected research, variable support was seen for evidence of a relationship between anger and violence. It would appear that anger is a strong risk factor within some contexts, particularly when its measurement is frequent and time-related to the incidents of violence being assessed. It is a highly predictive variable of violence risk when assessed at weekly and half-yearly

intervals. These strong correlations are also attached to patients within the community context, having a mixed history of no previous institutionalisation, as well as others having been retained within psychiatric and forensic contexts. No relationship was found between anger and violent offence history with weaker correlations between anger and scores across static violence risk assessment tools.

Methodological Issues

The small number of studies selected for inclusion within this review arose from the recognition of the need for specificity, due to poor definition of the constructs of anger and violence within the literature. Exclusion of studies pertained to the interchangeable use of terminology such as anger and hostility, leading to confusion as to which construct was the focus of assessment.

Due to inclusion/ exclusion criteria, this review included only studies of anger in those who evidenced a history of violent behaviour, whether this violence was distal or proximal in nature. This led to the exclusion of a number of studies of 'high risk' populations, as these studies contained no evidence that all of the patient group had committed violent acts and where there was evidence of disparate violence histories, data was not presented with this distinction being discernable. Many of the criticisms of violence risk investigation surround the high number of false positive predictions. As previous violence is acknowledged as a strong predictor of future violent behaviour (Hall, 1987) future research should seek to assess predictive risk factors in those who have a definite and discernable history of violent behaviour, to elucidate clearer profiles and credible consistent symptomatic markers of violence risk.

Similarly, a failure to explicitly state the behaviours under assessment, for example none discrimination of verbal or physical aggression, as well as synonymous assessment of all criminal behaviours, again led to omission. This was necessary as the literature recognises that the risk factors for violent and non-violent behaviours differ (Howard, 2009).

A number of excluded studies also utilised screening of historical data files or reports to ascertain motivations for violent offending. However, as this paper perceives anger experience to be internal and unique to the individual, the unsubstantiated nature of such appraisals was deemed to be outside of the scope of this review.

The failure to explicitly define and operationalize the constructs of anger and violence is undoubtedly central to the heterogeneity of the research field. Despite some emerging clarity within the theoretical literature, research persists with assessment of poorly defined constructs. This lack of conceptual clarity is subsequently intrinsic to poor selection of assessment methods. Multiple studies were excluded based upon their focus upon hostility and the attitudinal factors relating to angry affect. In an attempt to be as broad as possible, two studies detailed within this review, actually used inventories purported to measure hostility. However, based upon the authors ability to reflect upon the distinct theoretical principles underlying the constructs of anger and hostility, which is absent in so much of the literature, their studies were acknowledged and included, with the acceptance that they had accurately defined and delineated the construct under assessment as anger.

Temporal factors

The most significant factors in the link between anger and violence appear to be temporal. When anger is measured in the present, with correlations to previous violence history conducted, relation between these constructs is difficult to discern, with non-significant or weaker relationships being found. However, when violence histories are used to discern the presence of violence in community samples, significant associations, revealing higher anger in more violent individuals are found. This might be due to the fact that forensic records are drawn from more historical sources, whilst community records pertain to more recent instances of violent behaviour. In line with this, when anger and violent incidents are measured within the same time-frame, two included studies showing this within a six month window, higher anger experience is significantly associated with more incidents of violent behaviour.

These findings evidence the need for investigations of anger and violence to be conducted frequently in the monitoring of risk; as well as utilising tools which are sensitive to change over time, when conducting violence risk appraisals. Static measures of risk appear insensitive to intra-individual changes over time, which might be reflected in variability in anger experience, which could be intrinsically related to increased violent risk.

These findings however lead to confusion as to the failure to identify these relationships within populations who are institutionalised at the time of assessment. This may not signify the lack of a relationship between anger and violence per se, but might be more indicative of other factors. We must consider that these distinctions might pertain to the client group under investigation; the differences between these two hypotheses not being clarified through this review. It might be the case that anger is not as strongly associated to violent behaviour for persons, who being contained within the secure context, might be assumed to be the most violent in nature. However, this remains unlikely as Doyle & Dolan (2006) found anger to be a significant predictor of violence in patients discharged from both hospital and forensic contexts. These mixed findings clearly evidence the need for further exploration of risk markers within contained patient populations.

Another factor, already briefly discussed, might again relate to the period over which anger and violence is assessed, or more specifically, the sensitivity to change of the violence risk assessment tools. Loza and Loza-Famous (1999a) related current anger scores to static tools of risk assessment. These, unlike newer assessments, that now integrate static and dynamic factors, are not sensitive to changes over time. Therefore they may reflect violence risk from some period ago and individual changes that might have arisen in response to treatments might not be evident through the use of such tools. Therefore, as was the case upon comparison of violent history and current anger scores, we would expect weak to no associations of current anger scores with these tools. Appreciation of both static and dynamic risk variables could serve to

elucidate weaker associations and provide more evidence which would assist with violent risk prediction and treatment.

Mixed Gender Assessments

Of the included studies, four conducted assessment of anger and violence within mixed patient groups. However anger, with regard to experience and expression, has been shown to differ considerably between male and female populations (Suter, Byrne, Byrne, Howells & Day, 2002). These authors also suggested that gender differences evidenced in anger control, could relate to differences in the mode of anger expression, with males more frequently being aggressive and females more frequently exhibiting alternative behavioural outcomes such as self-harm or psychological distress (e.g. depression). Increasingly discernable patterns of anger and violence might therefore be more evident in single gender assessments, thus further clarifying the literature base.

Violence Typology

As research evidences that the most violent crimes are perpetrated by a comparatively small sub-group of the population (Skeem et al. 2002), focus upon these individuals with regard to the study of anger experience, could elucidate quite distinct and discernable symptomatic profiles.

Multiple papers were omitted on the grounds that anger was investigated in relation to 'criminal behaviour', unspecified 'aggression' or 'general criminal recidivism'. Within these studies, problems pertained to the lack of explicit definition as to what behaviours were being measured. This was in some cases not explicitly defined or involved the synonymous assessment of violent and non-violent behaviours, as well as failures to comply with release conditions.

There is some distinction between differing violence typologies in Maiuro et al. (1988) and Loza and Loza-Fanous (1999b). However, Maiuro et al (1988) states but does not statistically report, no significant differences between these groups and then continues with their

synonymous assessment in comparison to non-violent controls. Although, Loza & Loza-Fanous (1999b) conducted comparative analyses upon rapists and non-rapists across the anger measures, this latter group again holds potential for inclusion of persons with markedly differing violent offending histories.

A failure to distinguish between non-violent and violent behaviours, the risk markers and appraisal tools of which, have been shown to differ considerably (Howard, 2009), is a considerable weakness in the existent literature base.

With regard to the original review question, a relationship between anger and community violence does seem to be evident, with higher experience of anger, as well as lower anger control, relating to increased violent behaviour within the community. However, the evidence based, confounded by a lack of conceptual clarity and real differences in methodological quality, pertains to a less than conclusive picture.

Conclusions

Aside from the small number of studies examined within this review, it has achieved a systematic overview of what is a complex and poorly defined research area. It has identified anger as a risk factor for violent behaviour committed within the community context and has highlighted the need for further research. This research should be conducted within distinct populations, focussing specifically upon violent offending with clear definition of how this construct is being operationalized. In the same manner, the study of anger should be specific, proximal and self-reported. Ultimately, the selection of both anger and violence measurement methods should be embedded within overarching theory and sensitive to change.

Implications for practise

Due to the exclusion of anger management studies, due to their propensity to focus upon efficacy at reducing violence within in-patient settings, as well as an inability to identify community samples as physically aggressive or violent, rather than just verbally aggressive, this

review was unable to identify factors evidencing the efficacy of anger treatment to reduce violent behaviour.

However, upon consideration of management of violent patients within the community, very clear indication is seen for psychiatric patients discharged from forensic and hospital contexts, that frequent measurement of anger experience, will provide good indication of both proximal and distal violent behaviour. The findings of Skeem et al. (2006) signify that a patients risk in the community can be monitored upon the weekly level and when elevated anger one week is recognised, violent behaviour is significantly likely to occur both during the same week and the following week. With the availability of quick self-report screening tools for anger experience, such as the STAXI (Spielberger et al. 1988) used in this particular study, preventative measures such as increased supervision or support can be employed.

Future Research

This review evidences the disparate findings of studies assessing the relationship between anger experience and violent behaviour. However, it would seem that, particularly within patient groups, a significant association does exist. Skeem et al. (2006) not only evidence the utility of anger as a predictor of violence risk, but also highlights its dynamic nature.

This leads to the query of whether other studies, in both patient and forensic groups, which found weak to no association between anger and level of violence risk, determined through previous convictions or violence risk prediction tools, did so due to methodological factors.

Indeed, the conceptualisation of anger as having both enduring trait value, as well as state variations, raises questions as to whether static actuarial risk factors, such as age or number of prior convictions, as well as static risk prediction tools have sufficient sensitivity to detect such associations.

Although it is helpful to detect associations between anger and violent acts as they are committed, surely our focus must surround

improvement of establishing links to improve prediction, as violent incidents once committed, in the worst cases can result in high costs to individual victims and society.

Risk prediction tools have largely developed since the 1999 studies of Loza and Loza-Fanous. It is now accepted that violent risk prediction can be improved by the addition of dynamic predictive risk factors. Therefore, investigations of associations between anger and violence risk, using assessment tools which integrate static and dynamic factors, might help to improve detection of these small but relevant associations.

The use of these newer predictive risk assessment tools, sensitive to detection of change, would also assist with the temporal factors of anger and risk fluctuation, providing a means for continued assessment of anger and violence risk, as they could both inevitably vary over time or in response to treatment.

Limitations of review

As previously mentioned the number of studies selected for inclusion within this review was quite small. However, this was due to a lack of definition across studies, as to the construct being measured or the populations under review. Typical confusion stemmed from the interchangeable use of the terms anger and hostility as well as a failure to define what type of aggression or violence were being measured, verbal threats not being deemed sufficient for inclusion within this review.

Similarly, study of anger within 'high risk' populations, also resulted in multiple exclusions. Omission of studies in which violence histories could not be discerned or discrimination could not be made between anger experience within heterogeneous groups of non-violent and violent individuals might also have reduced availability of research for inclusion. These factors could have potentially led to the exclusion of some studies that may, had they been more explicit in their methodology and report, could have made significant contribution to this review of the evidence base.

Similarly, inclusion of studies only pertaining to self-report of anger experience further limited this review. However, this was deemed necessary due to the personal, sometimes unobservable and individual experience of anger.

The final factor related to multiplicity, as independence of Loza-Fanous (1999a; 1999b) could not be clearly ascertained. This might signify an over-emphasis on the lack of a link between anger and violence if these two studies drew from the same database.

It is undeniable that multiple factors such as poor conceptual clarity, as well as limited reporting of methodology, compromise the power of this review. However, it is hoped that such findings will assist to guide future research conducted within the areas of anger and community violence, serving to improve methodological rigor. High quality research within this area has potential to elicit significant outcomes for the development of treatment and assessment of violent individuals, which in turn would have significant positive impact at societal and individual levels. It is the potential of these positive outcomes which make the case for conduction of further research within this area.

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Journal Paper

This journal paper has been submitted to the International Journal of Forensic Mental Health which produces four issues per year. The named journal reflects the international audience represented by the International Association of Forensic Mental Health Services. This journal was selected due this international forum, within which research can be disseminated amongst forensic mental health professionals. The Journal of International Forensic Mental Health has specific interest in research conducted with patients in High Secure settings, particularly in relation to risk assessment, risk prediction and treatment. As such, this journal was deemed to be the most relevant to the topics under study within this paper.

Frontal Lobe deficits and Anger as violence risk markers for males with Major Mental Illness in a High Secure Hospital

Anne-Marie O'Hanlon
University of Lincoln

Dr Louise Braham
*University of Nottingham and
Nottinghamshire Healthcare NHS Trust*

Abstract

Clinical variables are essential to consider within violence risk research. Within this context, frontal lobe deficits are rarely studied. Examination of associations between anger and violence occur more frequently, yet display inconsistent findings. In a U.K High Secure hospital, 39 males diagnosed with Major Mental Illness completed the Wisconsin Card Sort (total score), Iowa Gambling Task (NET total) and State-Trait Anger Expression Inventory-2, (Anger Expression and Control-Out). The researcher or a clinical team member rated the Violence Risk Scale. Correlation and Regression analysis revealed that Wisconsin total and Anger Control-Out significantly predicted violence risk score [$F(2, 36)=8.175, p < .01$]. The significance of these findings in relation to psychological treatment is discussed.

Keywords: *Frontal lobe, Anger, Violence, Risk, Mentally Disordered Offenders.*

Running title: *Violence risk markers for males with Major Mental Illness*

Introduction

Prediction of violent recidivism is a fundamental component of forensic psychological assessment. Although not the sole criterion, these clinical decisions influence patient discharge. Wrongful detention results in deprivation of liberty (Shah & Heginbotham, 2010), whilst generating substantial financial costs (Davies, Clarke, Hollin & Duggan, 2007). However, public safety is also of importance as violent crime causes significant harm to victims, their families and wider society¹³ (Home Office, 2008). Within this research, violence is defined as "any act against a person(s) which resulted in either physical harm or significant psychological harm...not restricted to official conviction of violent crimes" (Wong & Gordon, 1999, p.74). *[See Extended Sections 1.1 & 1.2]*

Many diagnostic patient groups, particularly those classified as having Major Mental Illness¹⁴ (MMI; e.g. Swanson et al., 2006), have been characterised as violent. An example of this has been seen for patients diagnosed with schizophrenia who have been deemed by some to be a 'high-risk patient group' (Taylor et al., 1998). These perceptions have likely been influenced by studies identifying high rates of violent recidivism within patient populations. Lidz, Mulvey and Gardner (1993) found that of 357 community psychiatric patients, 45% were violent within a six month follow-up period. However, when focus was drawn to the violent patient sub-group, further behavioural disparity was revealed.

¹³ Hospital detention under the Mental Health Act (1983) aims to; maximise patients' safety, wellbeing (mental and physical), promote recovery and protect others from harm (Department of Health, Mental Health Act, 1983 (Revised 2008) paragraph 1.2).

¹⁴ Part 3 of the Mental Health Act 1983 (Department of Health; Amended 2007) widened definition of mental disorder to include "any disorder or disability of mind"

Gardner, Lidz, Mulvey and Shaw (1996) found that the most violent 5% of patients accounted for 45% of violent incidents. With patient violent recidivism rates continuing to vary between studies, consistency is only seen in the emergence of a disparate intra-diagnostic violence profile (Filley et al., 2001). Recognition that the presence of MMI alone does not predict violence has resulted in the adjustment of research focus upon individual and situational variables (Elbogen & Johnstone, 2009). *[See Extended Sections 1.3 & 1.4]*

Differences in individual and situational factors are inherent to the proposal of two typologies of violence, which have been applied to some patient groups (e.g. Broomhall, 2005). 'Instrumental' violence is described as "cold-blooded, non-emotional and premeditated for the purpose of personal gain" (Fontaine, 2009, p.243), whilst 'reactive' violence is characterised as "hot blooded, emotionally charged and enacted quickly in response to perceived provocation or to defend oneself" (Fontaine, 2009, p. 243). These typologies arose from the wider aggression literature (Feshbach, 1964). *[See Extended Section 1.5]* They are viewed to have different origins and aims, also being thought to be controlled in different ways (Berkowitz, 1993). Bandura's (1973, 1978) social learning theory has been used to offer some explanation of instrumental violence. This theory suggests that the incentive to engage in aggressive behaviour follows observation that this behaviour results in positive rewarding consequences for others. One explanation for reactive violence has been provided by reformulation of the frustration-aggression hypothesis (Dollard, Miller, Doob, Mowrer & Sears, 1939). *[See Extended Section 1.6]* This states that when expected goal achievement is blocked and an

aversive experience is caused, subsequent frustration gives rise to negative affect, which can contribute to aggression in certain situations (Berkowitz, 1993). *[See Extended Section 1.7]* Although this dichotomous distinction of violence has faced criticism (e.g. Bushman & Anderson, 2001) *[See Extended Section 1.8]*, it continues to offer some interesting hypotheses about the roles of cognition and affect within the context of violent behaviour. In addition, these typologies are proposed to give rise to differing treatment needs (e.g. Fontaine, 2007). *[See Extended Section 1.9]*

Anger

A significant difference between the reactive and instrumental typologies is the commission of violent behaviour in the presence or absence of negative affect. The emotion most commonly although not exclusively, linked to the reactive typology of violence, is anger (e.g. Scarpa & Raine, 2000). *[See Extended Section 1.10]* The proposal of anger presence in the commission of reactive violence and anger absence within the context of instrumental violence, could offer some explanation of the inconsistency found with regard to the anger and violence association within forensic populations. Consistent with Spielberger, Sydeman, Owen and Marsh (1999), anger within this research is perceived to be an affective experience varying from mild irritation to intense rage, differing considerably between individuals with respect to experience, expression and control.

Anger and Violence [*See Extended Section 1.11*]

Anger has undergone widespread assessment in relation to violence; yet inconsistent findings plague the evidence base. It is acknowledged that not all anger leads to aggression and not all aggression is underpinned by angry affect (Averill, 1982). However, higher levels of anger have been found in samples of violent forensic in-patients (Becker, Love & Hunter, 1997) and violent community patients (Doyle & Dolan, 2006). Support for correlations between anger and violence appear to differ based upon, the context in which these measurements are taken (i.e. in-patient versus outpatient), in addition to when these constructs are measured in relation to one another. Within the forensic in-patient setting, Loza and Loza-Fanous (1999) found no correlation between current levels of anger and previous violent convictions. However, within a similar population, Mills and Kroner (2003) found significant associations between the Anger Expression-Out scale of the State-Trait Anger Expression Inventory (STAXI; Spielberger, 1988) and number of prior assault convictions. Within the community, when both anger and violence can be considered proximally, clearer associations appear to be evidenced. Doyle & Dolan (2006) found that baseline anger scores were higher for those patients found to have been violent upon six-week follow-up. Similarly, Skeem et al. (2006) found significant correlations between the Brief Symptom Inventory-Hostility subscale (BSI; Derogatis & Melisaratos, 1983) score¹⁵ and violence within

¹⁵ The BSI-Hostility sub-scale has been found to assess emotional reactivity more than an attitudinal disposition; correlating moderately strongly with well-validated anger scales (Conger, Conger, Edmondson, Tescher, Smoling, 2003; Suris et al., 2004). Jarvis & Novaco (2006) concluded that it measures anger rather than hostility.

the same week. In addition, BSI-Hostility score at one week was found to be significantly predictive of violence the next week and the average hostility score over 26 weeks, was significantly associated to the number of violent incidents during this period. Findings such as this would implicate anger as a predictor variable of violence risk when proximate measurements are taken. Replication of this measurement method could assist in clarifying whether anger is a violence-related treatment need, for patients with MMI within the High Secure hospital setting.

Currently, proximate measurements of anger and violence within the in-patient setting are typically concerned with the study of anger-related violent incidents within this context (e.g. Mela et al., 2008). Similarly, the efficacy of anger-control interventions, predominantly designed for reactive individual's whose anger is under-controlled rather than over-controlled (Megargee, 1966; Beck & Fernandez, 1998), are judged upon their ability to reduce the frequency or severity of in-patient violence (e.g. Gorenstein, Tager, Shapiro, Monk & Sloan, 2007). However, as an individual's violence within in-patient and community contexts has been found to differ (Harris & Rice, 2003), these findings have limited utility for consideration of community violence risk. *[See Extended Sections 1.12 & 1.13]*

Frontal Lobe Deficits and Violence *[See Extended Sections 1.14 & 1.15]*

Another distinct difference between the reactive and instrumental violence typologies relates to cognitive functioning. Reactive violence is characterised by impulsive responding, unlike instrumental violence, which is attributed to the presence of planning, problem-solving and

decision-making in order to achieve a specific goal (Cornell et al., 1996). These cognitive processes place demands upon attention, concentration and memory. However, patients diagnosed with schizophrenia routinely display impairments in these cognitive capacities (Hurford, Kalkstein & Hurford, 2011). More specifically, frontal lobe functions have been implicated in success upon these cognitive tasks (Heaton, Chelune, Talley, Kay & Curtis, 1993; Bechara, 2007). It is therefore perhaps unsurprising that frontal lobe functioning has been found to be poor in reactive violent offenders (Fuster, 1997), yet intact within instrumental violent offenders (Raine, Stoddard, Bihle & Buchsbaum, 1998).

Violence risk research conducted with patient populations has seen considerable attention paid to variables such as command hallucinations (e.g. Braham, Trower & Birchwood, 2004) or comorbid substance abuse (e.g. Monahan et al., 2001). However, the relationship between frontal lobe deficits and violence is rarely considered, leading to only a handful of studies within the existent evidence base. Blake, Pincus and Buckner (1995) identified a high frequency of frontal lobe dysfunction in a group of individuals awaiting trial or sentencing, for murder. The authors equated these deficits to a lack of inhibitory control over cortical areas responsible for regulating emotional responses and making “rational decisions” respecting social convention (p.368). Krakowski and Czobor (1997) examined the role of frontal lobe impairments relating to impulse control and behavioural regulation in psychosis. They identified that the most persistently violent in-patients displayed increased prevalence of psychotic symptoms and greater frontal lobe impairment. Despite such findings, examination of frontal lobe function is not routinely incorporated into the

assessment of violent High Secure hospital patients. Instead, current neuropsychological investigations predominantly focus upon patients with specific brain injury diagnoses such as traumatic brain injury (e.g. Jamora, Young & Ruff, 2012). However, Martell (1992) commented that failure to consider such deficits within psychiatric patient groups could result in provision of ineffective or inappropriate treatments. Similarly, Broomhall (2005) stipulated that the assessment of executive function is crucial extension to treatment planning, in order to improve patient outcomes.

Psychological treatments for violence aim to respond to an individual's risk and need (Andrews & Bonta, 1998) [*See Extended Section 1.16*], as well as enhance quality of life (Ward, 2002). Within this process, individuals must acquire new knowledge and skills, yet frontal lobe deficits have been implicated in impaired learning (Rolls, Hornak, Wade & McGrath, 1994). Failure to address such difficulties could result in a patient's slower progression through their treatment pathway, prolonging their detention and restricting their liberty. Despite this, treatments for frontal lobe deficits (e.g. Cognitive Remediation Therapy; Wykes, Reeder, Corner, William & Everitt, 1999) are not routinely delivered within the High Secure hospital context. Although evidences bases are small, implementation of these interventions alongside existing treatments, has demonstrated improved frontal lobe functioning within patient populations (e.g. Wykes et al., 2007). It is therefore essential to investigate whether frontal lobe deficits are a violence risk treatment need for patients with MMI, so that appropriate interventions can be implemented. [*See Extended Section 1.17*]

Anger and Frontal Lobe Deficits [*See Extended Section 1.18*]

Although focus is drawn upon the differences in affect and cognition within the reactive and instrumental violence typologies, little investigation of the relationship between these constructs has been conducted. However, theoretical links have been suggested between frontal lobe impairment and anger. Damasio, Tranel and Damasio (1991) found insensitivity to punishment, as well as future consequences, in patients with frontal lobe damage. They proposed that greater frontal lobe deficits impacted upon reasoning and decision-making, in terms of personal and social conduct, having clear implications for behavioural inhibition of emotions such as anger. In line with this, increased anger experience (trait) has been found in patients suffering frontal lobe brain injury following stroke (Kim, Choi, Kwon & Seo, 2002). Conversely, with regard to cognitive processes, anger has been found to narrow the focus of attention, "skew information processing and bias judgement" (Schultz, Grodack & Izard, 2010, p.6). It is therefore important, not only to assess whether frontal lobe deficits or problematic anger are present for patients with MMI in the High Secure context, but also to explore the relationship between these difficulties.

Violence Risk Measurement

Although the importance of static factors such as violence history is acknowledged (Hall, 1987), their stability over the lifespan has led to a movement away from the use of structured violence risk assessment tools with predominant reliance upon static markers (e.g. Violence Risk Appraisal Guide; Quinsey, Harris, Rice & Cormier, 1998). [*See Extended*

Section 1.19] More recent risk assessment measures also incorporate dynamic variables, which are considered to be predictive of shorter-term risk and related to violence (Andrews, Dowden & Gendreau, 2009). These dynamic factors also heighten sensitivity to intra-individual variability or risk state (Skeem & Mulvey, 2002). Dynamic variables are also perceived to be changeable treatment targets, which have led to them becoming the focus of many forensic interventions (Andrews & Bonta, 1998). Only a few violence risk measures are designed specifically for prediction of violent recidivism. These yield relatively equivalent outcomes, being found to predict violence moderately well (Yang, Wong & Coid, 2010). It is therefore suggested that research focus be directed towards the identification of violence predictor variables, to inform treatment planning and enhance violence risk predictions (Yang et al., 2010).

Violence Risk Markers

A substantial proportion of violence risk marker research has centred upon the follow-up of discharged community patients (e.g. Skeem et al., 2006). However, it is questionable whether reviewing recidivism is the best way to generate new knowledge (Bjørkly, Sandli, Moger & Stang, 2010). Instead, informing clinicians of links between risk factors and violence, could be a means of improving accuracy of clinical decision-making (Doyle, Shaw, Carter & Dolan, 2010). The MacArthur Violence Risk Assessment study (Monahan et al., 2001) found that of the 134 risk factors measured, 70 had a statistically significant bivariate relationship with later community violence. However, not all of these will be relevant to patients with MMI within the High Secure hospital context and each

cannot be simultaneously measured within time-limited assessment periods. It is therefore important to begin to distinguish which variables hold most relevance to violence risk within this patient population.

Despite focus upon the roles of affect and cognitive function within the reactive-instrumental violence distinctions, these factors are largely under-represented within structured violence risk measurement tools.

Although anger has been found to be a predictive variable for community violence (e.g. Skeem et al., 2006) which is reviewed within many unstructured clinical risk appraisals, its appreciation within structured violence risk tools is limited. In addition, consideration of frontal lobe deficits within these measures is absent, although clinical judgements might be used to account for behavioural indications of such impairments (e.g. Impulsivity, HCR-20, Webster, Douglas, Eaves & Hart, 1997).

Although it is acknowledged that anger problems, as well as frontal lobe deficits, may apply to only a small number of those who violently offend, sufficient evidence exists to warrant their investigation in relation to High Secure hospital patients.

Aim and Hypotheses

In order to refine treatment focus and enhance violence risk appraisals for patients with MMI within the High Secure hospital setting, this study aimed to examine the relationships between frontal lobe deficits as measured by the Wisconsin Card Sorting Task (WCST; Heaton, 1993) and Iowa Gambling Task (IGT; Bechara, Damasio, Tranel & Damasio, 2005), as well as anger expression and control gauged by the STAXI-2

(Spielberger, 1999), in relation to the Violence Risk Scale (VRS; Wong & Gordon, 1999), a predictive judgement of violence risk.

Hypothesis 1:

Participants with greater deficits on frontal lobe measures will have:

- a) Higher VRS total scores
- b) Lower anger control out scores

Hypothesis 2:

Participants with higher anger expression index scores and lower anger control scores will have higher VRS scores

Hypothesis one will be tested using correlational analysis.

Correlational analysis will also serve to inform hypothesis two, prior to examining the interactional effect of the anger variables using hierarchical regression analysis. To achieve the best predictive model of VRS total score, linear regression analysis will then be conducted, including all independent variables found to have a significant relationship with VRS total score.

Methodology

Design *[See Extended Section 2.1]*

A cross-sectional study was conducted within the Mental Health Directorate of a U.K High Secure hospital. The participant sample constituted male, adult in-patients with a diagnosis of Major Mental Illness (MMI), detained under the Mental Health Act 1983 (Department of Health, 1983, Revised, 2007). The inclusion criteria were; male gender, aged 18-63 years, currently substance abuse free, deemed appropriate for inclusion by their Responsible Clinician and able to provide informed consent in accordance with the Mental Capacity Act¹⁶ (Department of Constitutional Affairs, 2005). *[See Extended Sections 2.2 & 2.3]* Exclusion criteria included; advice from a Responsible Clinician that a patient was medically unsuitable to approach, comorbid neurological diagnoses (e.g. Parkinson's disease, Multiple Sclerosis), electroconvulsive therapy in the previous six months, current or past gambling addiction and English language/ literacy difficulties or colour blindness preventing completion of the assessment battery. *[See Extended Section 2.4]*

Ethical approval was gained for this study from the Hospital's Clinical Director of Mental Health, the University of Lincoln Ethics Committee, Nottingham Research Management and Governance Committee, as well as Nottingham Research Ethics Committee 1 (See Appendices I-III). *[See Extended Section 2.5]*

¹⁶ In accordance with the Mental Capacity Act (Department of Constitutional Affairs, 2005), capacity was assumed unless it was established at the time of recruitment/ testing, that the individual was unable to make a decision for himself. The researcher made every effort to convey the information appropriately, so that the patient could make a decision.

Participants

A power calculation was conducted, assuming a medium effect size, based upon review of previous research utilising similar neuropsychological tests within forensic populations (e.g. Broomhall, 2005). Based on Cohen's criteria (1988), a power of 0.8 and an alpha of 0.05 were used. These were entered into the G*Power 3 software package (Faul, Erdfelder, Lang & Buchner, 2007) for a-priori calculation of sample size for linear regression analysis using four independent variables. The appropriate sample size was 43.

From 119 male in-patients, eight Responsible Clinicians deemed 99 individual's suitable to approach regarding participation. 18 patients declined to meet the researcher and 81 patients were directly approached. 41 patients chose not to participate and 40 patients were recruited. [*See Extended Section 2.6*] Participant age ranged from 22 to 55 years (Mean, 35.9; SD, 8.58). All participants had at least one violent criminal conviction and a primary diagnosis of MMI as classified by the tenth edition of the International Classification of Diseases (ICD-10; World Health Organisation, 1992). Table 1 demonstrates the participants' variation across violent index offences, clinical disorders and ethnicities.

Table 1: Participant Demographics

Demographic Characteristic	Number of Participants (%)
Violent Index Offence	
Murder	18 (45%)
Manslaughter	6 (15%)
Assault (including GBH & ABH) ^a	15 (37.5%)
Arson with intent to endanger life	1 (2.5%)
Diagnosis	
Paranoid Schizophrenia	21 (52.5%)
Schizophrenia	11 (27.5%)
Bipolar & Major Depressive Disorders	3 (7.5%)
Dual Diagnosis (Mental Illness & Paranoid Personality Disorder)	2 (5%)
Other (Delusional, Schizoaffective & Schizophreniform disorders).	3 (7.5%)
Ethnicity ^b	
White British	33 (82.5%)
African	3 (7.5%)
Mixed	3 (7.5%)
Pakistani	1 (2.5%)

Note: ^a GBH - Grievous bodily harm; ABH – Actual Bodily Harm.

^b Participants' own descriptions of their ethnicities

Procedure

All eight Responsible Clinicians within the Mental Health Directorate were approached by the researcher. A verbal overview of the study and a Responsible Clinician Information Sheet (Appendix IV) was provided. Review of inclusion/exclusion criteria led to generation of a list of patients deemed suitable to approach for participation. [See *Extended Section*

2.7.1] Individual appointments in ward-based interview rooms were booked for the researcher to verbally explain the study. Participant Information Sheets and Consent Forms were also provided (Appendix V & VI). Those who did not immediately decline participation were re-visited by the researcher seven days later, with consent forms being collected from willing participants (N=40). *[See Extended Section 2.7.2]* All 40 assessment sessions were conducted in quiet ward-based interview rooms. *[See Extended Section 2.7.3]* Five minutes were allocated for patients' familiarisation with use of the laptop, before administration of the WCST (computerised version), STAXI-2 self-report questionnaire (sub-scales 2 and 3) and computer-based IGT. This administration order was maintained for each participant as ordering effects were thought to be unlikely, due to the interspersing of written and computer-based tasks. Assessment sessions lasted an average of 45 minutes.

Following this assessment session, a file review was conducted to extract demographic information relating to age, diagnoses, offending history and ethnicity. Files were also screened for the presence of a VRS assessment, completed in the previous six months by members of the Violent Offender Treatment Programme, who are formally trained in the scoring and administration of the VRS. For the 28 participants without a recent VRS assessment, relevant information for scoring was extracted from psychology files, before a further interview was conducted with the participant. Wong and Gordon's (1999) semi-structured interview schedule was followed, with training and support provided by a formally trained nurse consultant. *[See Extended Section 2.7.4]*

Independent Variables

Frontal Lobe Function *[See Extended Section 2.8]*

Measurement of frontal lobe function focussed upon reasoning and decision-making abilities. As many patients with MMI display deficits in memory and attention (Bozikas, Kosmidis, Kiosseoglou & Karavatos, 2006), the computerised formats of these tests were used, to reduce demands upon these higher order executive functions (Larquet, Coricelli, Opolczynski & Thibaut, 2010).

Wisconsin Card Sorting Test

The Wisconsin Card Sorting Test Computer Version 4 (WCST: CV4¹⁷; Heaton, 2003) was used for examination of dorsolateral prefrontal cortex function. On screen, the WCST presents four stimulus cards and one response card. The stimulus cards reflect three parameters, colour, form and number, whilst the response card displays varying forms of these parameters. The response card must be matched to a stimulus card based upon the presence of one or more of the three stimulus parameters. Participants are not told the rule of matching but the computer displays whether their selection is correct after each response. From this, the participant must deduce the matching rule. This procedure continues until ten correct responses are produced within each domain of the six category sequence (colour, form, number, colour, form, number), or all 128 cards have been administered. Upon completion a computer

¹⁷ WCST CV:4 will be referred to as WCST from here on due to restrictions in word count

generated report is produced, from which 'Total Correct' was the variable of interest (WCST total). *[See Extended Section 2.8.1]*

The WCST has been standardised and normed for use with participants aged between six years and six months, to 89 years (Heaton et al., 1993). It is used extensively across clinical and research contexts, as a measure of frontal lobe, as well as executive function, evidencing good reliability and validity (Heaton et al., 1993). *[See Extended Section 2.8.1.1]*

Iowa Gambling Task

The IGT assesses and quantifies decision-making abilities, associated with the medial orbitofrontal cortex, as well as ventromedial prefrontal cortex, under conditions of reward, punishment and uncertainty (Bechara et al., 2005). The computer screen presents four decks of cards (A, B, C and D) and the participant is instructed to win as much money as possible, through selection of a card from any deck, in any sequence. Participants are blind to which two decks are advantageous (lesser gains, smaller losses) with overall gain, and which two are disadvantageous (high gains, substantial losses) with an overall financial loss. Each selection produces a message displaying how much the participant has won or lost. A smiling face accompanies a win, whilst a frowning face is produced with a loss. A monetary bar at the top of the screen shifts to show the win or loss incurred. After the administration of all 100 blocks, the IGT Net total raw score is generated, which was the variable of interest (IGT total). *[See Extended Section 2.8.2]*

Standardisation norms for the IGT are available for adults aged between 18 and 89 years. It has been used to evidence disadvantageous decision-making in patients with schizophrenia (Sevy et al., 2007), as well as investigation of forensic patients' decision-making in relation to in-patient aggression (Bass, 2010). The IGT has evidenced good reliability and validity across these research contexts (Bechara, 2007). *[See Extended Section 2.8.2.1.]*

Anger *[See Extended Section 2.9]*

State Trait Anger Expression Inventory-2 (STAXI-2; Spielberger, 1999)

The STAXI-2 is a 57-item self-report questionnaire which measures state and trait domains of anger, in addition to levels of anger expression and control. It contains three scales, each of which has an identical 4-point response scale (1- almost never to 4 – almost always). Within this study, focus was drawn to two of these scales. The ten-item trait anger scale (scale 2) assesses how often angry feelings are experienced over time, with a high frequency of experience being attributed to a personality trait. The 32 item anger-expression index (scale 3) provides a combined anger expression and control profile. These scales generate a number of sub-scale scores. Attention was drawn to the specific inspection of the Anger Control-Out (AC-O) index, measuring “how often a person controls outward expression of angry feelings” and the Anger Expression Index (AX-In.), providing a general index of anger expression, based upon responses to the expression and control scales (Spielberger, 1999, p.2). *[See Extended Section 2.9.1]*

The STAXI-2 has been validated for use with psychiatric hospital patients aged between 18 and 63 years (Spielberger, 1999). It has been widely used for the purposes of assessment, treatment planning and evaluation within forensic populations (Braham, Jones & Hollin, 2008), evidencing good reliability and validity (Spielberger, 1999). *[Extended Section 2.9.1.1]*

Dependent Variable

Violence Risk *[See Extended Section 2.10]*

Violence Risk Scale (VRS: Wong & Gordon, 1999)

The VRS comprises of six static and twenty dynamic variables (See Appendix VII). All of these variables are theoretically or empirically linked to violence within the risk assessment and treatment literature (Wong & Gordon, 1999). Following a clinical interview and file review, the VRS is scored by the assessor. All variables are rated on a scale of zero to three; a higher rating indicating that a variable is closely linked to violence in the individual's lifetime. An integrated Stages of Change model allows ratings across two categories, pre-treatment assessment and response to treatment, both contributing to the calculation of the total score. *[See Extended Section 2.10.1]*

The VRS has been well validated for use with male forensic patients (Wong & Gordon, 1999; 2006). *[See Extended Section 2.10.1.1]* Although violence risk groupings have been developed from total scores (Low<35; Medium, 35-49; High≥50), skewed distribution towards the higher risk

level was expected within this High Secure hospital population. Therefore, VRS total score was selected as the dependent variable (0-78).

Data Analysis [See Extended Section 2.11]

Analysis was conducted using SPSS for Windows version 19. Inter-rater reliability was assessed using the intra-class correlation coefficient (ICC), which is the appropriate measure of reliability for continuous data (Bartko, 1991). Assumptions of normality were measured, leading to the exclusion of one outlier (N=39). The associations between the indicators of decision-making, anger and violence risk were examined using bivariate correlational analysis. One independent variable of decision-making had no statistically significant relationship with the dependent variable. Hierarchical regression analysis was then conducted to examine the interaction between the anger variables and their relationship with VRS total score, using the method outlined by Baron and Kenny (1986). VRS was entered as the dependent variable, with AC-O and AX-In. entered at step one and the interaction term AC-O*AX-In. entered at step two. Finally, to obtain the best predictive model of VRS total score, the three independent variables which correlated significantly with VRS total score were entered into a two-stage Linear Multiple Regression analysis (enter method). Post-hoc analysis from this initial regression model revealed collinearity and led to the removal of one independent variable. Linear Multiple Regression analysis was then re-run, producing the final regression model.

Results

Normality of the data and Inter-rater reliability [*See Extended Sections 3.1-3.4*]

Evaluation of normality revealed one outlier, evident through plot and z-score analysis. Upon examination, this participant had a VRS total score of 17.68 which was unreflective of this High Secure sample, being more indicative of a community patient. Case wise exclusion of this participant was conducted, to improve the skew and normality of the data. The final data set contained no missing data (N=39). Inter-rater reliability was assessed using a sub-set of 28 VRS assessments. These 28 VRS assessments were rated by the researcher and also independently scored by one member of the Violent Offender Treatment Programme team, resulting in two sets of scores. The ICC was calculated to assess the consistency between these two sets of scores. The ICC used was a two-way random effects model for absolute agreement (Shrout & Fleiss, 1979). Using the distinctions identified by Landis & Koch (1977), inter-rater reliability for VRS total score was found to be very high [ICC(2,2) = .91].

Correlations

Bivariate correlations were run between the predictor variables; WCST total, IGT total, AC-O, AX-In and the VRS total outcome variable. The main purpose of this analysis was to confirm the presence, magnitude and direction of associations between these variables.

Table 2: Summary of inter-correlations, Means and Standard Deviations

Measure	1	2	3	4	5	M	SD
1. WCST	-	.193	-.198	.051	-.332*	65.05	13.15
2. IGT	-	-	.007	.144	-.125	5.95	31.51
3. AX-In	-	-	-	-	.429** .798**	38.05	13.99
4. AC-O	-	-	-	-	- .457**	21.62	6.31
5. VRS	-	-	-	-	-	53.26	11.72

*Note: * Correlation is significant at the 0.05 level (2-tailed), ** Correlation is significant at the 0.01 level (2-tailed)*

[See Extended Section 3.5]

Decision-making and Violence Risk

Bivariate correlational analysis revealed no statistically significant correlation between IGT total and VRS total ($r = -.125$; $p > .05$). In contrast, WCST total significantly and negatively correlated with VRS total ($r = -.332$, $p = 0.023$), indicating that poorer performance on the WCST, signified by a lower WCST total score, was associated with a higher VRS total score.

Decision-making and Anger

No statistically significant associations were found between WCST total and IGT total ($r = .193$, $p > .05$). Similarly, WCST total showed no significant correlations with AC-O ($r = .051$, $p > .05$) or AX-In ($r = -.198$, $p > .05$). IGT total also showed no significant correlations with AC-O ($r = .144$, $p > .05$) or AX-In ($r = .007$, $p > .05$). As such, decision-making abilities, measured through the WCST total and IGT total, were not found

to be significantly associated to the selected anger variables, as measured by the STAXI-2.

Anger and Violence Risk

AC-O evidenced a significant negative correlation with VRS total ($r = -.457$; $p = 0.003$). Poorer control of outward expression of angry feelings was associated with higher VRS scores. AX-In displayed a significant positive correlation with VRS total ($r = .429$; $p = 0.006$). That is, higher VRS total scores were associated with higher AX-In scores, which in this population, reflected individuals with high anger experience and expression, in addition to lower anger control. Although significant associations were found between the anger variables and VRS total score when examined independently, hierarchical regression analysis revealed no statistically significant correlation between the interaction variable [AC-O*Ax-In.] and VRS total score ($t = -.245$, $p = .808$). [*See Extended Section 3.6*]

Multiple Regression Analysis [*See Extended Section 3.7*]

To produce the best predictive model for VRS total score, standard linear multiple regression (enter method) was performed with VRS total as the dependent variable and WCST total, AC-O and AX-In. as independent variables, all showing significant correlations with VRS total score when examined independently. For the purpose of evaluation of assumptions, additional statistics including 'Descriptives', 'Collinearity diagnostics', 'Mahalanobis distance' and 'Casewise diagnostics' of the residuals were selected. A regression plot of standardised residuals (y-axis) against the standardised predicted values (x-axis) was also specified. Due to the small

sample size, the standard deviations criterion was reduced from the default setting of +/-3, to +/-2 for the inspection of outliers, as suggested by Field (2009). Review of the residuals plot and use of a $p < .001$ criterion for Mahalanobis distance, showed no outliers amongst the sample. No missing data was identified ($N=39$). Collinearity was identified between AC-O and AX-In. ($r = -0.789$, $p < 0.001$), consistent with Field's (2009) criteria ($r = 0.8/0.9$). After running preliminary multiple regression analysis, post hoc examination of zero order and partial correlations revealed that AX-In. was the weakest contributor to the predictive model, its co-efficient falling short of statistical significance. [See Extended Section 3.8] As such, the AX-In. was removed from the final multiple regression analysis.

A standard linear multiple regression (enter method) was conducted with VRS total as the dependent variable, with WCST total and AC-O as the predictor variables.

Table 3: Summary of Multiple Regression Statistics for predictor variables

<i>Dependent Variable = VRS total score</i>			
Predictor Variable	B	SE B	β
Constant	88.91	9.718	
WCST total	-.276	.124	-.310
AC-O	-.819	.259	-.441

Note: B = Unstandardized coefficient, SE B = Standard Error of B, β = Standardised beta coefficient.
 $R^2 = .304$, $F(2, 36) = 7.861$, $p < .001$

A significant model was produced, $F(2, 36) = 7.861$, $p < .01$. Altogether, 30.4% (Adjusted 26.5%) of the variability in VRS scores was predicted by WCST total and AC-O. This final predictive model exhibits

that a one unit improvement in WCST total score, predicts a reduction in VRS total score by 0.3. Similarly, a one point improvement in AC-O score is predicted to elicit a reduction in VRS total by 0.82. In combination, a simultaneous improvement upon both of these independent variables by one point would be associated with a reduction in VRS total score by approximately 1.1 point.

Discussion

Main Findings

Partial support was found for the hypothesised association between deficits across frontal lobe measures and higher VRS scores. Poorer WCST performance was significantly associated with higher VRS scores, however the relationship between IGT total and VRS score, despite being in the hypothesised negative direction, did not reach significance. No significant associations were found between poorer performance on frontal lobe measures and anger control scores. Significant associations were found when VRS total score was examined in relation to AX-In. and AC-O independently, with higher VRS scores significantly correlating with poorer outward anger control and higher AX-In. scores. However, no significant interaction effect was found between the two anger variables and VRS total score, contrary to the second hypothesis. The final Multiple Regression analysis identified that WCST total and AC-O scores were significantly predictive of VRS total score, with a one unit increase in both WCST total and AC-O giving rise to a one point one unit decrease in VRS total score.

Frontal lobe deficits and violence risk judgements

No significant relationship was found between total scores on the WCST and IGT. This is in accordance with most previous studies examining the association between performance on these two frontal lobe measures within MMI populations (e.g. Beninger et al., 2003; Ritter et al., 2004). These findings support the proposal that the WCST and IGT measure different aspects of frontal lobe functioning. This perhaps reflects the distinction made by Bechara, Damasio, Damasio and Anderson (1994) that IGT performance relates to medial orbitofrontal and ventromedial pre-frontal function, rather than dorsolateral prefrontal function, which has been attributed to WCST performance (Ritter et al., 2004). *[See Extended Sections 4.1.1 & 4.1.2]*

The significant association found between VRS total scores and WCST performance could indicate that deficits related to dorsolateral prefrontal functions, might be more specifically related to violence risk judgements within this population. One explanation of this relationship might be provided by the instrumental-reactive dichotomy (e.g. Fontaine, 2009), with frontal lobe impairments being identified in individuals who are classified as reactively violent (e.g. Fuster, 1997). WCST scores indicate abilities in reasoning, planning, organisation and problem-solving, which support the direction of behaviour towards goal achievement (Chelune & Baer, 1986). Impairment in these abilities could lead to failures in goal attainment, which are experienced as frustrating (Berkowitz, 1993). Coupled with the presence of poor problem-solving and weak inhibitions, violent responses to such frustrations could be

hypothesised to arise more frequently. In line with this, many authors have identified that the length and demands of the WCST often give rise to frustration in participant groups (e.g. Aikins & Ray, 2001). This has led to recommendations for the use of alternative, shorter forms of the WCST (Sherer, Nick, Millis & Novack, 2003). Within the current study, anecdotally it was observed that quite a number of participants became extremely frustrated whilst completing the WCST. Frustration has been linked to an increased likelihood of aggression, particularly in males (e.g. Bettencourt & Miller, 1996). Therefore, one tentative suggestion is that the frustration elicited by the WCST, could hold similarities to the affective experience described within the frustration-aggression hypothesis of violent behaviour. Functional analysis of participant's violent behaviour would help to examine this suggestion.

In contrast, IGT total score, although reflecting impairment across most of the participant sample did not significantly correlate with VRS total score. One possible explanation for this finding might be based upon the design of the IGT. The decision-making process involved in monetary risk-taking, with negative consequences relating to financial loss, could be viewed as quite distinct from the risk-taking and decision-making associated with commission of interpersonal violence. In addition, anecdotally it was observed that unlike with the WCST, participants within the current study did not become frustrated whilst completing the IGT. Participants reported enjoyment of the task, even when performance was poor, indicating a lack of frustration. This could be related to the fact that although large sums of money were lost during the game, these were not real personal losses. The suggested differences in task experiences of the

WCST and IGT may be supported by the absence of a significant correlation between performance on these two measures.

The deficits in IGT performance, shown by most participants within this study however, do indicate problems in learning from previous experience, as well as difficulty taking multiple factors into account within the process of decision-making (e.g. risk, uncertainty, rewards and punishments; Bechara, Tranel & Damasio, 2000). Considering the negative implications that these impairments could hold for decision-making upon a participant's return to 'high-risk' situations, these deficits reflect a significant treatment need within this population.

The presence of frontal lobe deficits within this High Secure MMI population, are potentially clinically important findings which could have significant implications for daily adaptive functioning, as well as treatment. Many forensic treatments aim to equip patients with new adaptive problem-solving strategies (Dawson, Kingsley & Pereira, 2005). However, the frontal lobe deficits demonstrated within this population, could potentially restrict the level to which these patients would benefit from emotional control or violence risk treatment programmes. A patient's failure to achieve expected treatment targets could result in the potential for repetition of treatment programmes, higher violence risk appraisals and prolonged detention.

Despite these significant implications (Martell, 1992), examination of frontal lobe abilities is not routinely integrated into forensic hospital risk assessments. It is therefore recommended that inspection of frontal lobe function is integrated into all forensic hospital assessments, enabling

these outcomes to be considered within treatment planning. [See *Extended Section 4.1.3*] In addition, all patients with frontal lobe deficits could be offered specific interventions to address these difficulties, such as Cognitive Remediation Therapy (e.g. Wykes et al., 1999). [See *Extended Sections 4.1.4 & 4.1.5*]

These findings serve to enhance an impoverished neuropsychological research base within High Secure forensic settings; with evidence of frontal lobe deficits found in other 'violent' populations (e.g. Broomhall, 2005), also being identified within this population. In addition, previous focus upon frontal lobe deficits in relation to historical violent convictions (Blake et al., 1995) and current in-patient violence (Krakowski & Czobor, 1997) has been extended to consider future violence risk.

Frontal Lobe deficits and Anger

In contrast to the theoretical associations proposed within the literature (e.g. Damasio et al., 1991; Schultz et al., 2010), this study found no significant associations between the frontal lobe measures (WCST & IGT) and anger variables (AX-In. & AC-O). The failure of the WCST to significantly correlate with either AX-In. or AC-O, might reflect the proposal that cognitive and emotional decision-making are distinct; with WCST performance being specifically attributed to cognitive processing within the dorsolateral prefrontal cortex (Ritter et al., 2004). In addition, no significant associations were found upon the correlation of AX-In. and AC-O with IGT total score. Although a substantial number of patients displayed impairment in IGT performance, suggested to reflect

emotional decision-making (Bechara et al., 1994), within the current study, these deficits were not directly associated to higher levels of anger expression or poorer anger control, as measured by these STAXI-2 subscales. These findings would indicate that although cognitive and emotional difficulties coexist, as proposed for the reactive offender, these deficits do not appear to be directly and significantly associated.

One alternative explanation of these findings could relate to the measurement strategies used within this study. With regard to decision-making, the IGT does not provide a direct or specific measurement of emotion. Instead, it provides a measure of emotion-based learning, dependent upon an individual's performance during the task (Bowman & Turnbull, 2004). The AX-In. and AC-O indices of the STAXI-2 also do not reflect current levels of anger arousal, but trait aspects of an individual's anger expression and control (Spielberger, 1999). Simultaneous appraisal of decision-making abilities and anger arousal (e.g. state anger; Spielberger, 1999) may provide more sensitive analysis for future study. Further research is required in this area, with this being the first known study to empirically investigate theoretical links between frontal lobe deficits and problematic anger, within the High Secure MMI context. *[See Extended Section 4.2]*

Anger and Violence Risk Judgements

Participants reported lower anger control scores leading to a tendency for outward anger expression, consistent with Megargee's (1966) description of the under-controlled angry individual. *[See Extended Section 4.3.1]* These high Anger Expression Index scores, as well as low

outward anger control scores, were found to independently correlate significantly with higher judgements of violence risk. This association, taken with the deficits in frontal lobe abilities, might reflect potential for affectively-driven reactive violence within this population. However, this hypothesis would require further investigation through specific analysis of the participant's violent behaviour. *[See Extended Section 4.3.2]* Although significant associations were identified between VRS total score and the anger variables when measured independently, no significant association with VRS total score was found upon examination of the interaction variable (AC-O*AX-In.). These findings indicate that the two anger variables do not have an interaction effect with respect to their relationship with VRS total score.

Participants mean scores upon the anger expression and outward control indices however, were poorer than normative scores for an adult control population (Spielberger, 1999). This indicates that problematic anger is an on-going treatment need for these patients. *[See Extended Section 4.3.3]* Anger management programmes have been shown to be beneficial in addressing anger-driven violence within the in-patient context (e.g. Jones & Hollin, 2004), however outcomes are not always consistent (Novaco, 2011). *[See Extended 4.3.4]* It is therefore important to extend the current evidence base, conducting further dynamic appraisals of anger and violence risk judgements within the in-patient setting, as well as establishing what specific factors of anger interventions are most effective in their reduction of predictive community violence risk judgements. *[See Extended Section 4.3.5]*

Predictor variables of violence risk judgements

WCST total score and outward anger control were both found to be significant and independent predictor variables, accounting for 30% of the total variance in violence risk judgements within this High Secure MMI patient population. A one point increase in both WCST total and AC-O corresponded to a one point one decrease in VRS total score. Outward anger control was the strongest of these predictor variables, signifying its importance in relation to judgements of violence risk within the forensic in-patient setting. These findings perhaps indicate that offering anger control strategies could be the most effective aspect of anger interventions for these participants, in relation to reduction of violence risk judgements. Enhancing external anger control could be hypothesised to lead to better interpersonal relations, not only reducing the patient's risk to others, but risks to the patient. WCST total score was also found to be a significant predictor variable of violence risk judgements, indicating that improved abilities in reasoning, planning and organisation, could enhance patients' treatment outcomes. Better problem-solving skills would further enable patients to become more adaptive in their responses to changing environmental conditions, assisting positive behavioural change (Chelune & Baer, 1986). *[See Extended Section 4.4.1]*

The current findings evidence the utility of re-focussing clinical research towards predictive study within the in-patient setting. Little recent violence risk research has been conducted within this context, the period at which such findings would be most beneficial for treatment planning and violence risk appraisals. These results also suggest that

more comprehensive violence risk appraisals should precede treatment planning. Within the current study, the combined treatment of frontal lobe deficits and outward anger control could lead to a small yet significant reduction in violence risk judgements. *[See Extended Section 4.4.2]*

Strengths, Limitations and Future Research

Strengths of this study include the clear definition of constructs, which serves to enhance conceptual clarity for the reader *[See Extended Section 4.5.1]*; whilst specific sampling methods ensured the presence of a substantial violence history. Multivariate analysis enabled refinement of focus, allowing for weaker, inter-related variables to be removed. Violence risk assessment was maximised through use of self-report and file-based information, providing a dynamically sensitive assessment. *[See Extended Section 4.5.2]* Inter-rater reliability of these assessments was also found to be very high. Use of the VRS within this study is further beneficial to future research, as its Stages of Change model, constitutes an integrated framework sensitive to treatment change. This study is to my knowledge, the first to assess these specific frontal lobe deficits as violence risk markers within the MMI High Secure context.

In considering the results of this study, some limitations must also be acknowledged. The main limitation relates to the fact that actual violent recidivism was not measured within this study. Although data relating to in-patient violence would have been accessible within this High Secure context, it is widely recognised that behaviour during incarceration is not an effective predictor of post-release community behaviour (Harris & Rice, 2003) and predictors of violence are found to differ across these

contexts (Steinert, 2002). Therefore the VRS, a predictive judgement of community violent recidivism, was used as the dependent variable.

Another limitation of this study pertained to sample size, which limits the generalisation of any considered results. *[See Extended Section 4.5.3]*

Recruitment specificity, although improving the focus of the study, restricted the potential sample population. This also limited the number of violence risk variables which could be simultaneously assessed, conflicting with the knowledge that multiple violence risk markers exist (e.g. Monahan et al., 2001) and it is the cumulative effect of these which gives rise to violent recidivism. The inspection of frontal lobe deficits and anger, at the exclusion of other known violence risk variables, limited the strength of the predictive model. In addition, the absence of comparative, medium-secure, low-secure or community populations also restricts the generalisation of these findings beyond the High Secure context. Finally, ordering effects could have impacted upon IGT performance as the computer software was novel to most participants. Therefore operational demands upon memory and attention, skills found to be weaker within MMI populations, could remain high following the familiarisation period. As such, participant responses upon the IGT would have been most affected by inattention, memory loss or fatigue. *[See Extended Section 4.5.4]*

With regard to future research, perhaps the most important development would relate to the investigation of this predictive model in relation to post-release community violent recidivism. It is also suggested that this predictive model further be assessed within medium-secure and low-secure patient contexts; to establish whether frontal lobe deficits and outward anger control are treatment needs across violent populations.

This would enable the current predictive model to be further tested and could potentially increase generalisation of the current findings. The predictive and dynamically sensitive methodology used within the current study could be replicated to explore violence risk variables across forensic in-patient settings. This could potentially benefit treatment planning and risk appraisal within these contexts, specific to the populations within which they are applied. Finally, further research is required to establish the extent to which both frontal lobe impairments and outward anger control can be improved through treatment. Subsequently, the degree to which these changes impact upon violence risk judgements might then be explored. *[See Extended Section 4.5.5]*

Conclusion

This study contributes to a growing body of violence risk marker research. These findings highlight the importance of consideration of frontal lobe deficits and outward anger control, in the contexts of assessment, treatment planning and violence risk prediction for patients with MMI in the High Secure hospital context. Further research is recommended to assess the potential relationship between frontal lobe deficits and anger control in patients with MMI. Finally, future research relating to the degree to which frontal lobe deficits and anger control can be addressed through treatment, in addition to examination as to the degree to which improvements in these skills may impact upon violence risk judgements is suggested. *[For ethical and critical reflective components see Extended Sections 5 & 6]*

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Extended Paper

This aspect of the portfolio provides information beyond the scope of the journal paper.

1.0. Extended Introduction

This section of the extended paper provides additional detail surrounding the literary context within which this study was grounded.

1.1. The social and clinical relevance of this study

Although violent crime accounts for only one per cent of all crime committed, individual as well as social implications are widespread (Home Office, 2008). The Government's recognition of this led to the development of a three-year action plan, "Saving Lives. Reducing Harm. Protecting the Public" (Home Office, 2008). This called for improvements in risk assessment, offender treatment and management, supported by an increase in funding allocation.

Within forensic settings, 2005 saw the introduction of the indeterminate public protection (IPP) sentence (Home Office, Criminal Justice Act, No.225, 2003). This sentence detains violent offenders until they are deemed to have reduced their risk, typically through completion of offending behaviour programmes. In March 2011, a review of IPP prisoners within the United Kingdom was conducted. Of 6,550 IPP prisoners, 4780 of these were convicted for violence against the person or other violent crimes, excluding sexual offences (Ministry of Justice, 2011). Longer-term detention, placing greater demands upon services, has led to pressure to identify violence risk markers.

One context, within which long-term detention is common, is the High-Secure hospital setting. A ten-year review of trends in United Kingdom (UK) High Security hospital referrals and admissions has demonstrated continuing increase in demand for beds (Jamieson, Butwell, Taylor & Leese, 2000). In addition, analysis of patient admissions has revealed increasing complexity in patient presentations over this ten-year review period (Jamieson et al., 2000). Within these High-Secure hospital settings, Schizophrenia has been characterised as the "core condition", with approximately 47% of patients having this as their primary diagnosis (Thomson, 2000, p. 252). However, high levels of patient re-admission

and violent recidivism have been found following discharge from these “low volume, high-cost secure services” (Davies et al., 2007, p.70). Therefore, further investigation of violence risk factors for patients with Major Mental Illness, is needed, to enhance treatment efficacy.

1.2. Violence Definition

Review of the literature reveals a number of overlapping and poorly defined concepts within violence risk research. Terms are used interchangeably, such as ‘violence/ violent behaviour’ (Hornsveld, Nijman, Hollin & Kraaimaat, 2007), or ‘assault’ (Swanson, 2006). Similarly, failure to distinguish between verbal and physical acts leads to problems in interpretation of ‘aggression’ (Gelles, 1985). Conceptual difficulties arise from the expectation that these varying terms equate to assessment of a synonymous ‘violence’ construct. Heterogeneity is seen with regard to the nature and severity of aggression or violence under inspection, as well as the methods through which these behaviours are measured (Gothelf, Apter & van Praag, 1997). This leads to difficulty with the generalisation of findings and replication of research. The provision of a violence definition within this study clearly benefits the reader.

Violent behaviours subject to assessment across the research field vary considerably. Focus between studies differs based upon measurements of verbal or physical violence (Vitacco et al., 2009), as well as violent acts ranging from minor to major severity (Skeem et al., 2006). Heterogeneity may also be seen as some research considers all anti-social behaviours (e.g. Vitacco et al., 2009), whilst others acknowledge only actions leading to criminal prosecution (e.g. Sreenivasan, Kirkish, Shoptaw, Welsh & Ling, 2000). Recognising that only taking account of official convictions has the potential to largely under-estimate an individual’s violent behaviour, strength is seen in this study’s consideration of non-adjudicated violence across the lifespan.

1.3. Violent Populations

Studies assessing violence risk in patient populations frequently fail to explicitly state the presence of previous interpersonal violence (e.g.

Howard, Huband, Duggan & Mannion, 2008). This is contrary to Hall's (1987) caution that future violence should never be predicted in the absence of previous violent behaviour. Within this study, the report of convictions for violence clarifies for the reader that predictions of future violence are being made within a population known to have been previously violent. In addition, international comparisons are facilitated, as the nature and severity of violence committed by patients with Major Mental Illness within this U.K High Secure hospital is made explicit.

1.4. Major Mental Illness

Historically, within violence risk research, patients with a diagnosis of Major Mental Illness (MMI) in particular, have been assessed as a homogenous violent population (Elbogen & Johnson, 2009). This assumption could be attributed to the Mental Health Act (1983) combining four diagnostic groups (mental illness, mental impairment, severe mental impairment and psychopathic disorder), under the broad classification of mental disorder. Under this act, patients with a 'mental disorder' can be formally detained for their own safety or for the protection of others. This might underpin assumptions of equal levels of violence risk within, as well as between these diagnostic groups. Detention for protection of others most commonly gives rise to the description Mentally Disordered Offender (Mental Health Act, 1983); however use of this term has been excluded from this study. This is due to the fact that patients deemed to be mentally disordered offenders are inaccurately perceived to be more 'dangerous' than non-mentally disordered offenders and this categorisation has been found to lead to an increased likelihood of prolonged detention (Halleck, 1987).

Revision of the 1983 Mental Health Act (Department of Health, 2007) led to the broadening of the mental disorder definition. 'Mental Disorder' now being described as "any disorder or disability of mind", reflects a movement away from the discrete diagnostic categorisations of the tenth edition of the International Classification of Diseases (ICD-10; World Health Organisation, 1992) or Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR, American

Psychiatric Association, 2000). A similar progression has been seen within the violence risk research. Initial focus upon MMI categories revealed disparate intra-diagnostic profiles of violence risk (Filley et al., 2001). It was therefore recognised that specific MMI diagnoses alone failed to predict violence (Monahan et al., 2001), leading to a suggested shift in focus upon individual clinical variables (Elbogen & Johnson, 2009), which has been recognised within this study.

1.5. Aggression dichotomy and inconsistent terminology

Since the development of the aggression dichotomy, different terms have been used to describe this distinction. Vitiello, Behar, Hunt and Stoff (1990) referred to affective and predatory aggression, whilst Crick and Dodge (1996) distinguished between reactive and proactive aggression. Alternatively, Kingsbury, Lambert and Hendrickse (1997) delineated between hostile and instrumental aggression, whilst Stanford, Houston, Villemarette-Pittman and Greve (2003) used the terms impulsive and premeditated aggression. The concepts underlying these terms remain the same, despite differences in language use. The terms instrumental and reactive are used within the current study.

1.6. The reformulation of the Frustration–Aggression hypothesis

The original frustration-aggression hypothesis proposed that aggression was emotionally-driven, resulting from interference with the expected attainment of a desired goal (Dollard, Miller, Doob, Mowrer & Sears, 1939). Berkowitz (1993) acknowledged the utility of this original model in respect to its explanation of reactive rather than instrumental aggression and developed the following reformulation. This included attention to the fact that mere deprivation of a goal was not in itself sufficient to result in aggressive behaviour. Instead, it was necessary for the blocking of this goal to be experienced as aversive, with such situations giving rise to negative affect (e.g. anger, depression, anxiety). Berkowitz (1993) also stated that Dollard et al. (1939) did not give sufficient attention to the way in which thought processes can influence the reaction to the goal blocking, with regard to behavioural instigation or inhibition. Finally, Berkowitz (1993) expanded upon common beliefs that

arbitrary, illegitimate or personally-directed interferences give rise to aggression, with the acknowledgement that aggression is sometimes displayed when interference is not personally-directed or is socially justified.

1.7. Anger Experience within Violence

Anger is one affective experience which is commonly associated with the frustration-aggression hypothesis (e.g. Scarpa & Raine, 2000). Within this framework, anger is perceived to be a negative affective state within the context of reactive violence (Berkowitz, 1993). However, this 'defensive' view of affect-driven violence is not the only impulsive typology which has been proposed. Howard, Huband, Duggan and Mannion (2008) define an offensive typology of impulsive violence, which is committed in the presence of positive affect or 'thrill-seeking anger'. This typology is motivated by the desire to maximise excitement through infliction of harm on another (Howard et al., 2008). This limitation of the frustration-aggression hypothesis must be acknowledged as these two types of anger-driven violence could relate to quite different treatment needs.

1.8. Critique of the reactive-instrumental violence typologies

The utility of the reactive-instrumental dichotomy has been questioned upon a number of grounds. Some authors believe that the dichotomy fails to account for aggressive acts with mixed motives (Bushman & Anderson, 2001). Appearing to support this viewpoint, Woodworth and Porter (2002) found mixed motives in 43% of official descriptions of 125 male homicide offenders. However, a distinct primary reactive or instrumental motivation was still identifiable, leading to classification of 92% of cases. Some authors have chosen to broaden the instrumental-reactive typology to form a four tiered classification system. For example, Tapscott, Hancock & Hoaken (2012) delineated between; purely instrumental violence, instrumental-reactive violence, when violence is initiated to achieve an instrumental goal but escalates responsive to an unplanned event, reactive-instrumental violence, in

which violence begins immediately following provocation but an external gain other than causing harm is achieved and purely reactive violence.

Further criticisms relating to the overlap between the instrumental and reactive dichotomy propose that reactive violence is in fact instrumental, as its goal is the reduction of an aversive stimulus (McEllistrem, 2004). Yet the distinct theoretical models underpinning each violence typology and the reformulation of the frustration-aggression hypothesis in particular (Berkowitz, 1993), provide evidence against this position (Tapscott et al., 2012). Another related criticism pertains to the belief that the dichotomy cannot account for instrumental behaviour, that when practiced, becomes automatic no longer requiring attention (Bushman & Anderson, 2001). However, this critique reflects the view that information processing is the defining feature of reactive or instrumental violence, instead of one of several factors, which in itself is problematic (Tapscott et al., 2012).

The child and adolescent literature has also identified a strong overlap between instrumental and reactive violence typologies (Polman, Orobio de Castro, Koops, van Boxtel & Merk, 2007). Yet it has been found that within these populations, questionnaires elicit a response bias (Polman et al., 2007) and items fail to delineate between the sub-types (Hubbard, McAuliffe, Morrow, & Romano, 2010). Child and adolescent literature has also evidenced intra-individual variability in the use of reactive and instrumental violence during these pre-adult years (Polman et al, 2007). In contrast, study of adult populations has evidenced consistency in the typology of violence used by an individual; therefore suggesting that one type of violence begins to predominate in adulthood (Tapscott et al., 2012). Although the adult literature has seen less study of the instrumental-reactive dichotomy, supportive evidence of this distinction has been found. For example, Tapscott et al. (2012) found that within a sample of 71 violent male offenders, generating details relating to 220 offences, 188 of these could be dichotomized as primarily instrumental or reactive. The remaining 32 incidents were found to be unclassifiable due to insufficient detail. However, some limitations were evident within this study. Serious violent offenders were under-

represented within the sample, limiting the generalisation of these findings to high-risk populations. In addition, analysis was conducted upon official convictions only, which although targeting the most severe violence in the participant's history, would have underestimated their total offending behaviour (Hood & Sparks, 1970). Although every case of violence may not be classifiable within this framework, a large proportion may have an identifiable primary instrumental or reactive underpinning, which could assist in treatment planning.

1.9. Treatments based upon violence typology

As instrumental violence is perceived to be controlled, management of such behaviour is therefore thought to be more likely to respond to environmental reinforcement (Vitiello & Stoff, 1997). It has been suggested that these offenders should be treated within environments absent of reinforcement of instrumental aggression or violence, with rule violations being strictly and promptly responded to (Fontaine, 2007). Treatments could include social problem-solving training, in which non-aggressive means to goal achievement are taught and promoted (Tyson, 1998).

In contrast, reactive violence is characterised as an anger-driven response to perceived provocation, accompanied by cognitive impairments. In this case, strategies geared towards enhancement of emotional control have been proposed (Fontaine, 2007). These could include a number of behavioural based strategies such as relaxation training, to positively alter responses to provocative events (Berkowitz, 1993; Tyson, 1998). Social skills training could also promote socially appropriate emotional expression, assertiveness and problem-solving (Fontaine, 2007).

1.10. The construct of Anger

Review of the literature reveals disparity with regard to the way in which anger is defined. Whilst some researchers view anger as a unitary construct, referring to affective, behavioural and cognitive components interchangeably; others view these as distinct units for individual analysis

(Spielberger, Sydeman, Owen & Marsh, 1999). Some authors believe that inaccurate descriptions of the components of anger under measurement are problematic to the evidence base (e.g. Skeem et al., 2006). However, these theoretical distinctions are now becoming clearer (Potegal, Stemmler & Spielberger, 2010). Martin, Watson and Wan (2000) state that it is important to recognise anger as an affective experience, separate from hostility or aggression. Anger within this study, is seen to be a three-fold construct, a "psychobiological emotional state" (Spielberger et al., 1999, p.1), with additional attitudinal (hostility) and behavioural (aggression) components. The affective experience of anger is explored within the current study as a predictor variable of violence risk judgements and consistent with Martin et al. (2000) this is perceived to be distinct from the construct of violence which is also assessed. This is supported by the fact that violence is not exclusively anger-related (Averill, 1982). Furthermore, it is only one of a range of behavioural responses within the context of anger experience (Spielberger, 1999).

1.11. Anger and Violence

The relationship between anger and violence suffers from a lack of conceptual clarity. Although anger and aggression are clearly distinguished on a theoretical level (Potegal et al., 2010), the empirical evidence base sees frequent exchange of these terms within research (Eckhardt, Norlander & Deffenbacher, 2004). In response to such difficulties, the constructs of anger and violence are explicitly defined within this study.

It is suggested that anger and its behavioural component aggression, are associated with an increased risk of criminality and represent one of the most costly problems in modern society (Hare, 1999). A heightened propensity to experience anger has been linked to violent behaviour (Novaco & Taylor, 2008), undoubtedly leading to interest in its value as a predictor variable of violence (e.g. Wang & Diamond, 1999). Whilst correlations between anger and violence are not always large, they are found to be equivalent to known violence risk markers, such as psychopathy (Douglas & Webster, 1999).

1.12. Over-controlled and under-controlled Anger

Megargee (1966) purported that violent offenders could be classified within two streams. "Uncontrolled aggressive" individuals possess weak inhibitions, being frequently and chronically angry. This results in a more impulsive offending history. The "chronically over-controlled" individual is akin to Freud's idea of strangulated affect (1961 as cited in Murray, 1985). The over-controlled individual retains anger until the levels exceed the individual's psychological resources to cope. Megargee (1966) characterised this presentation as chronically inhibited and excessively compliant, rarely expressing anger. However, this unexpressed emotion would eventually lead to a violent response that would likely be extreme and homicidal. These over-controlled and under-controlled presentations might offer some explanation of the disparity seen in levels of anger amongst groups of violent offenders (e.g. Loza & Loza-Fanous, 1999).

1.13. In-patient and community violence

A number of studies have highlighted that violence committed within the community does not reflect violence committed within the in-patient context. For example, data collected by Adams, Meloy and Moritz (1990) did not find a trend for greater in-patient violence, committed by those who displayed more violence within the community prior to hospital admission. In addition, violence risk predictors have also been found to differ between institutional and community settings (Steinert, 2002). Variables which predict violence moderately well within the community (e.g. gender, diagnosis or substance abuse; Monahan et al., 2001) were found to have limited predictive power for violence within the in-patient setting (Steinert, 2002). It was proposed that this disparity was likely due to differences in social environment factors (e.g. criminal peers, strained interpersonal relations) or availability (e.g. alcohol and drugs) across institutional (e.g. forensic or hospital) and community settings (Steinert, 2002). It is now widely acknowledged that behaviour during incarceration is not an effective predictor of post-release community behaviour (Harris & Rice, 2003).

1.14. Frontal Lobe Deficits

A number of studies highlight the importance of increasing attention to neuropsychology within the context of violence risk research. Neurological dysfunction is reported at a rate of 1-2% in Western Industrialised populations, yet elevated rates of between 10 and 67% have been recorded in studies of offender populations (Miller, 1999). In a sample of patients detained within a High Secure hospital for violent offences, 84% of patients were found to have at least one indicator of organic dysfunction (Martell, 1992). Similarly, findings by Adams et al. (1990) identified that those with the most severe histories of out-patient violence, also had the greatest neuropsychological impairment. This study although being conducted over 20 years ago, used the Luria-Nebraska Neuropsychological Battery-revised (Golden, Hammeke & Purisch, 1980), which is now in its third edition. However, these findings do have some limitations. This comparative analysis of patients who were violent (N=32) and non-violent (N=5) within the community setting was conducted despite an under-representation of non-violent patients. In addition, although violence was well operationalized within this study, data was drawn solely through official convictions, which can largely under-represent an individual's offending behaviour (Hood & Sparks, 1970).

The concept of neuropsychological impairment encompasses wide-ranging cognitive abilities. Discordance is seen with regard to what is believed to constitute 'Executive Functions'. Lezak (2004) describes a number of higher order cognitive processes including; working memory, attention, planning, reasoning and cognitive flexibility. However, deficits in memory and attention are widely accepted as a major characteristic of schizophrenia (Gambini, Campana, Garghentini & Scarone, 2003) and are therefore unlikely to underpin the different violence profiles seen for patients with schizophrenia (e.g. Taylor et al., 1998). Further research is subsequently required to ascertain which specific cognitive processes are more closely aligned to violence risk.

Frontal lobe deficits contribute to multiple cognitive, as well as social difficulties (Grafman, Holyoak & Boller, 1995). They are frequently

purported to be a fundamental factor leading to patients' psychopathology, social dysfunction (Holthausen et al., 2002) and violent behaviour (Angermeyer, 2000). Ritter, Meador-Woodruff and Dalack (2004) have evidenced differences in the level of impairment related to decision-making, amongst patients with schizophrenia. Questions have therefore been raised as to what implications specific deficits in reasoning, planning, organisation and cognitive flexibility, skills integral to effective decision-making, could have in relation to violent behaviour (Sreenivasan et al., 2000; Barkataki et al., 2005).

1.15. Frontal Lobe Deficits and Violence

A number of factors could be attributable to the presence of frontal lobe deficits within High Secure hospital patient populations. Increased physical aggression has been found in brain injury patients, following frontal lobe damage (Pardini et al., 2011). One recognised cause of acquired brain injury is closed head injury, typically attributed to traffic accidents, assaults or falls (McGrath, 2008). These types of incidents might be more common over the lifetime of High Secure hospital patients, many of whom have since childhood, engaged in anti-social behaviours. Active symptoms of mental health have also been related to hypometabolism of the frontal lobe functioning (e.g. Wolkin et al., 1992). In addition, the hypothesis has been raised that frontal lobe impairment in schizophrenia might be due to the effects of antipsychotic medication, as frontal hypometabolism has not been consistently found in patients who have never been medicated (e.g. Szechtman et al., 1988). Yet comparisons of medicated and never-medicated patients have identified frontal lobe impairment within both of these groups (e.g. Crawford, Obonsawin & Bremner, 1993). It is reasonable to assume that multiple and interacting factors likely underpin frontal lobe impairment within High Secure patient populations; yet it is the presence of such deficits, rather than their cause, which are important for process of effective treatment planning. However, clinical assessments within such hospital settings, fail to adequately investigate these difficulties. This persists despite knowledge that such deficits can result in reduced treatment benefits and

an inability to generalise what is taught (Anderson, Jacobs & Anderson, 2008).

1.16. Risk, Need and Responsivity

According to Andrews and Bonta (1998), three principles are important to consider in the planning and commission of risk-reduction interventions. The 'Risk' principle aims through the process of assessment, to identify an individual's level of risk and put into place, appropriate interventions. For example, a high-risk patient would be deemed to be in need of more intensive management and treatment. The 'Need' principle states that structured violence risk assessment tools, with dynamic predictor variables, can be used to identify changeable treatment targets specific to the individual (Yang, Wong & Coid, 2010). Finally, the 'Responsivity' principle is concerned with the accessibility of a treatment for the individuals for whom it was designed, as well as its efficacy in reducing risk. This can be monitored through use of structured risk assessment tools which are sensitive to tracking change in response to treatment. Through assessment of violence risk markers within this High Secure MMI population, this study could provide a valid contribution to the 'Need' principle.

1.17. Cognitive Remediation Therapy

One example of a treatment for deficits associated to frontal lobe function is Cognitive Remediation Therapy. This uses repeated exercises to assist in addressing an individual's cognitive difficulties, which affect their functioning. Although having a smaller evidence base than some cognitive rehabilitation therapies (e.g. Reasoning & Rehabilitation; Ross, Fabiano & Ewles, 1988; Tong & Farrington, 2006), Cognitive Remediation Therapy was developed specifically for patients with schizophrenia and its efficacy within this patient group has been recognised (Poletti et al., 2010). Wykes et al. (2007) conducted a trial of Cognitive Remediation Therapy plus treatment as usual, compared to a treatment-as-usual control group. Cognitive Remediation Therapy was delivered following a manual-based programme (Delahunty, Reeder, Wykes, Newton & Morice, 1999) on an average of three times per week, over a 26 week follow-up

period. Although a wider array of cognitive abilities were assessed within this study, specific focus upon the cognitive flexibility task (Wisconsin Card Sort Test; WCST; Heaton, Chelune, Talley, Kay & Curtis, 1993) revealed positive and significant results. Prior to treatment, participants' baseline scores on the WCST fell below the 16th percentile, which was an essential study inclusion criterion. Post treatment performance upon the WCST evidenced that 8% of the control group (N=15) and 33% of the Cognitive Remediation Therapy group (N=17) achieved a normal score. This increased to 44% of the control group (N=15) and 55% of the Cognitive Remediation Therapy group (N=16) achieving a normal WCST score at 26 week follow-up. Although positive, these findings have some limitations. A small sample size was used within this study which might have lacked sufficient power to detect small changes between groups. In addition, the follow-up period of only 26 weeks makes it unclear as to how these effects are sustained over a longer duration, whether deterioration over time may occur and at what rate. This study is only part of a growing evidence base for Cognitive Remediation Therapy, which evidences initial support for its efficacy as a psychological treatment to address cognitive difficulties in patient populations (e.g. Twamley, Jeste & Bellack, 2003; Krabbendam & Aleman, 2003).

1.18. Anger and Frontal Lobe Deficits

Within the context of forensic patient populations, the relationship between anger and frontal lobe abilities, relating to decision-making, is largely theoretical. However, such associations have been empirically substantiated within other populations. The effects of neuropsychological dysfunction on anger experience can be found subsequent to brain injury, with patterns reflecting an individual's more frequent and intense experience of anger following injury (Potegal et al., 2010). Similarly, anger is reported to elicit increased risk taking and optimism surrounding risk-taking outcomes (Litvak, Lerner, Tiedens & Shonk, 2010). With little research focussing upon investigation of the impact of decision-making deficits upon anger control; this was explored within the current study.

1.19. Violence Risk Measurement

Following recognition that unstructured clinical judgements were prone to error and bias (Andrews, Bonta & Wormith, 2006), the development and use of structured risk assessment tools became routine within clinical forensic practice (Yang et al., 2010). These were originally based upon tools reviewing historical or static factors (Douglas & Skeem, 2005), which were found to be strongly predictive of future violence, particularly within forensic populations (Menzies & Webster, 1995). Static risk factors were also found to offer insight into re-offending 'typology', with historically violent offenders being found to be more likely to engage in violent recidivism (Schwaner, 1998). Although static assessment tools were able to distinguish between individuals who displayed large variations in violence risk, they were found to lack sensitivity to distinguishing between 'high-risk' patients (Braham, Oldfield, Williams, Parkin & Jones, 2010). In addition, they were further criticised for their failure to track an individual's variation in risk over time (Kraemer et al., 1999). This led to the integration of dynamic risk variables within structured violence risk assessment and prediction tools.

2.0. Extended Methodology

This section provides supplementary information and detail, pertaining to aspects of study methodology, extending beyond the scope of the journal paper.

2.1. Epistemological position

My epistemological position falls within the positivist tradition, holding the belief that an objective, true reality exists, external to the observer. Knowledge is discovered through confirmation or falsification of hypotheses, drawn from the belief in the probabilistic outcome, that external factors shape development. In a context in which confounding variables are controlled, observable phenomena are assessed within a replicable and empirically supported process of experimentation. These phenomena include neuropsychological tests, as well as response to reliable and valid questionnaires.

2.2. Capacity to Consent

In accordance with the Mental Capacity Act (2005), the following principles were applied during this study. Patients were assumed to have capacity, unless it was established that capacity was lacking. Exclusions made by the patient's Responsible Clinician were not to restrict the patient's rights or freedom of decision-making, but reflected the acceptance of decisions made by a qualified and knowledgeable proxy. These exclusions were deemed to be in the patients' best interests. During recruitment patients were not deemed to be unable to make a decision, unless every possible action had been taken to support the patient to do so, without success. Patients deemed to lack capacity, were those unable to make an informed decision whether to participate within the research, because of temporary or permanent impairment/ disturbance in the functioning of the patient's mind or brain.

2.3. Informed Consent

Guidance outlined within the Mental Capacity Act (2005) was used within this study. A patient was deemed unable to make an informed decision to participate, if he were; unable to understand the relevant

information, retain this information, use this information as part of the decision-making process and communicate his decision. Every effort was made to ensure that information regarding the study's purpose and requirements, were presented in a manner understandable to each patient. To maximise understanding this included, use of simple language within the Participant Information Sheet and verbal explanation of the study during recruitment. One week was deemed appropriate for consideration of participation, providing reasonable time for patients to consult the researcher, research supervisor or a member of their clinical team, should they wish to seek advice. Seven days later, when consent was proffered, participants were asked to verbally clarify their understanding of the research, before each point upon the consent form was jointly reviewed. Fluctuations in motivation, physical and mental health are potentially problematic factors within any patient group. In recognition of this, before embarking upon the assessment process, the researcher re-clarified the requirements of the assessment session, asking the patient to verbally confirm their on-going wish to participate.

2.4. Inclusion/ Exclusion Criteria

The inclusion and exclusion criteria were defined to increase methodological rigour and safeguard patients. The inclusion criteria served to maximise the participant sample with potential inclusion of every male in the Mental Health Directorate. Age restrictions of 18-63 related to the ages between which the STAXI-2 (Spielberger, 1999) is validated. With acknowledged impact upon neuropsychological performance (e.g. Alcohol; Sullivan, Rosenbloom, Lim & Pfefferbaum, 2000 & Opioids; Lyvers & Yakimoff, 2003), only those patients deemed to be currently free of substance abuse were suitable for inclusion. Agreement from a patient's Responsible Clinician, as well as the ability to provide informed consent upon recruitment, are essential criteria in light of the Mental Capacity Act (Department of Institutional Affairs, 2005). Patients with diagnosed neurological conditions such as Parkinson's disease or multiple sclerosis were identified for exclusion based upon the fact that cognitive deficits are already recognised with regard to these movement disorders (Lange et al., 1992; Denney, Sworowski & Lynch, 2005). Any patient having

received electroconvulsive therapy (E.C.T) six months prior to recruitment was excluded due to findings of global cognitive deficits, particularly with regard to memory, following ECT (Sackeim et al., 2006). Patients identified as unable to complete the assessment battery, due to language or literacy difficulties, were excluded as validity of assessment results would be questionable due to the length of some instructional material. A translation service was financially beyond the scope of this research. Colour-blind patients were excluded, consistent with the WCST administration guidance (Heaton et al., 1993); the ability to decipher colour being integral to completion of this assessment. Finally, any patients with a current or past history of gambling addiction were excluded to safeguard participant well-being, due to the use of a gambling task.

2.5. Ethical Considerations

2.5.1. Potential Distress

Potential stressors were highlighted within the Responsible Clinician and Participant Information Sheets. This enabled the protection of participants at two levels, firstly a Responsible Clinician deeming them inappropriate for inclusion and the patient themselves being able to decline involvement, in full knowledge of any risks. Participants completing a VRS assessment were subject to its close inspection of their relational and criminal histories, therefore several protective options were employed. Prior to beginning the interview, the participant was informed that disclosure of intention to harm themselves or others, as well as disclosure of the commission of unprosecuted crimes, or intention to commit future crimes, would be reported to their clinical team. This could result in subsequent appropriate action by the clinical team and/ or police. The participant was further informed that they had the right to withhold responses to any questions and the option of post-assessment de-brief with the researcher, supervisor or a chosen member of their clinical team.

2.5.2. Potential Benefits

Verbal clarification was made, that consistent with hospital policy, no financial payment would arise from participation. The Participant

Information Sheet outlined that individual assessment feedback would not be available to participants or their clinical team, Responsible Clinicians were not promoting involvement within this study and direct treatment benefits would not result. However, as the VRS is completed within routine clinical care, any of these assessments completed within the context of this research, were to be added to clinical files, preventing repetition. General feedback of group results was to be provided to all participants, outlining the study's findings. A PowerPoint presentation of the research and its findings has been delivered to the clinical team. This could indirectly benefit patients should further neuropsychological or anger assessments, as well as treatment revisions, be elicited.

2.5.3. Confidentiality

Several practises were employed to ensure patient confidentiality. The Responsible Clinician as the initial point of contact meant that patient names, beyond those suitable to approach, were not disclosed to the researcher. Reasons for exclusion were also not conveyed. Clinical file reviews were not conducted by the researcher, until a signed patient consent form had been obtained. Recruitment sessions and assessment sessions were booked in ward-based interview rooms, providing privacy. All patient contacts had to be electronically recorded for security purposes. During this process patient confidentiality was maintained through non-disclosure of dialogues or assessment outcomes, unless confidentiality exceptions outlined in the Participant Information Sheet were contravened. Disclosure of this kind did not prove necessary. Similarly, feedback to the clinical team after assessment sessions, related to general appraisals of patient's mood. Finally, dissemination of findings to participants, clinicians and any subsequent publications will not contain patient identifiable information.

2.5.4. Data Storage

The following data storage procedures received ethical approval. A participant number was allocated to each signed consent form. These numbers were then used on computerised assessments in place of names and also on the STAXI-2 response booklets. All data gathered using the

laptop was saved onto the researcher's encrypted memory stick, not onto the laptop, due to future shared use. All consent forms and STAXI-2 response forms were placed within two different sealed envelopes, displaying the name of the researcher alongside content details, specifically, 'Confidential Research Data' and 'Paper-only contents'. Destruction dates were outlined as 1st August 2018, consistent with the seven year retention period. The encrypted memory stick was placed into a third sealed envelope, which also contained the encryption password for deletion of all data after seven years. These envelopes were locked into separate cabinets in the researcher supervisors' office. The database for statistical analysis remained anonymous, created upon the researcher's password protected hard drive. In accordance with the Participant Information Sheet, the 28 new VRS assessments were placed within the relevant section of each patient's clinical file.

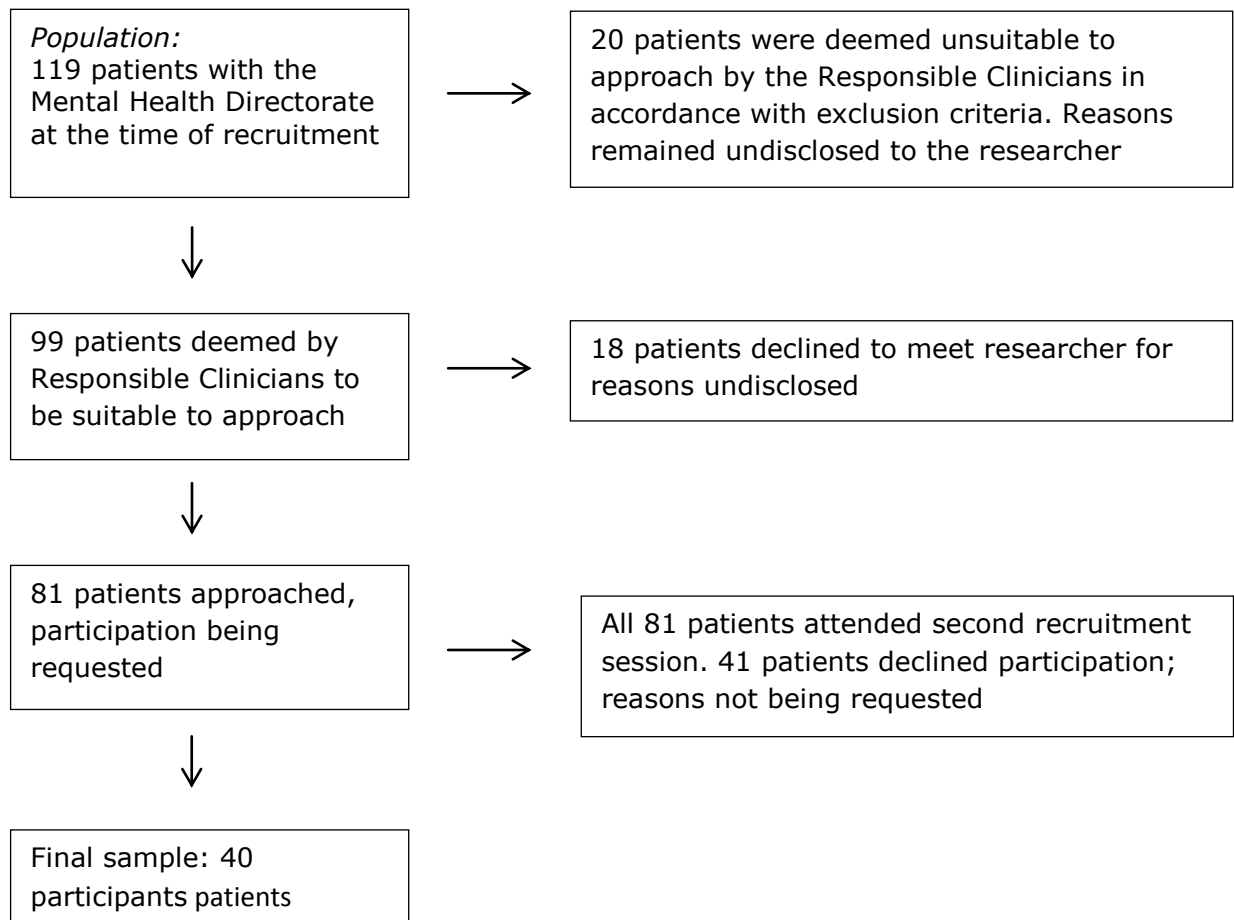
2.5.5. Dissemination

General written feedback will be provided to each participant and a PowerPoint presentation has been delivered to the clinical team. No patient identifiable data would occur within either of these. The journal paper resulting from this study will be put forward for publication, as well as for presentation at an international forensic research conference.

2.6. Recruitment

The following flowchart captures the process of recruitment, through each of the delineated stages.

Figure 1: Recruitment Flowchart



2.7. Procedure

2.7.1. Approach for Responsible Clinician participation

Appointments were made with each of the eight Responsible Clinicians within the Mental Health Directorate. Within this appointment verbal explanation of the study and clarification as to how their assistance was desired was given. A Responsible Clinician Information Sheet was presented by the researcher, containing study details, patient participation requirements, as well as inclusion and exclusion criteria. Responsible Clinicians directed questions to the researcher, before each one agreed to support with recruitment. Based upon inclusion/ exclusion criteria, a list of patient names deemed suitable to approach for participation was generated. Names of those deemed inappropriate to participate remained undisclosed, as well as the reasons for these exclusions.

2.7.2. Approach for participant consent

Ward based appointments for the purposes of 'research recruitment' were then booked in consultation with nursing staff. Pre-booking allowed for use of a private interview room, at a time convenient to each patient. Patients were informed that they could meet with a researcher on a specified time and date, but their attendance was voluntary. In line with the Mental Capacity Act (Department of Constitutional Affairs, 2005), voluntary consent was supported through multiple means. Participant Information Sheets made clear that participation was not endorsed by a patient's Responsible Clinician, merely agreement for the researcher to approach the patient had been granted. In addition, the opportunity to withdraw consent, leading to removal of a participant's data, was possible until completion of the final assessment. With regard to any recruitment or assessment sessions, patients were advised that non-attendance would be interpreted as passive withdrawal from the research.

2.7.3. Neuropsychological Assessment

Private ward-based interview rooms were essential to provide a well-lit, quiet context, free from distraction, consistent with guidelines for administration of neuropsychological assessment (e.g. Heaton et al., 1993; Bechara et al., 1994). Ward-based rooms further facilitated access for poorly mobile or non-ambulant patients, as well as enabling on-going supervision of participants by nursing staff. Furniture included two comfortable chairs and a table, set up prior to the participant's arrival. The laptop was fully charged, negating the use of electronic leads, which would constitute a safety risk. Pre-booking of recruitment and assessment sessions avoided compromise of the patients' weekly therapeutic commitments or voluntary activities. In case of difficulties, several means of contacting the researcher were provided in the Information Sheet.

2.7.4. Violence Risk Assessment

A formally trained nurse consultant provided in-house VRS assessment training to the researcher. Upon completion of VRS assessments, participants were given the option to complete multiple

shorter sessions, however no participant felt this was necessary. Although brief breaks were taken, no de-brief support was requested. A small number of participants refused to provide information sufficient for scoring certain items, leading to their omission. However, this was not sufficient to prevent generation of a pro-rated total score using the formula provided by Wong and Gordon (2006). The 28 VRS assessments rated by the researcher were inter-rated by the trained nurse consultant. Where variations in item scores were evident, further discussions were held and when score agreement was reached, the VRS scores were included in the database and assessments were placed into relevant patient files.

2.8. Rationale for frontal lobe measures

One of the distinctions highlighted within the reactive-instrumental dichotomy of violence, relates to the presence or absence of cognitive impairments. More specifically, deficits in frontal lobe function have been identified for reactive violent offenders, whilst instrumental violent offenders have been found to have relatively intact frontal lobe function (Raine et al., 1998). Therefore, frontal lobe deficits could constitute a violence risk treatment need, for some of the participants within the current study. Measures sensitive to the assessment of frontal lobe functioning were therefore selected for use.

Within the reactive-instrumental violence dichotomy, focus is drawn to cognition and affect. A similar distinction has been made with regard to decision-making. These cognitive and emotional decision-making processes have been linked to activation in different regions of the frontal lobes. Cognitive decision-making has been linked to the dorsolateral pre-frontal cortex, whilst emotional decision-making is proposed to relate to the ventromedial pre-frontal cortex and orbito-frontal cortex (Bechara et al., 1994). In addition, it has been found that patients with schizophrenia display differing profiles of functioning across these two decision-making domains (Ritter et al., 2004). Many studies have found deficits in cognitive decision-making (e.g. Shurman, Horan & Nuechterlein, 2005), whilst others studies have identified intact cognitive, but impaired emotional decision-making (e.g. Lee et al., 2007). Therefore, to achieve

the broadest assessment of decision-making within this High Secure MMI patient population, two distinct measures of frontal lobe function, with proposed specificity to these differing cognitive and emotional decision-making processes, were selected for use within this study.

2.8.1. Wisconsin Card Sorting Test (WCST; Heaton et al., 1993).

The WCST is a measure of executive function, reported to display particular sensitivity to frontal lobe functioning (Heaton et al., 1993). More specifically, completion of this task has been linked to dorsolateral pre-frontal activation, which has been attributed to cognitive decision-making (Bechara et al., 1994). Although it is one of the most widely used measures in clinical and neuropsychology (Spreen & Strauss, 1998), its specificity has been questioned. Brain imaging studies attempting to link activation within specific brain regions, to discrete aspects of WCST performance (e.g. attentional set-shifting), have found a complex pattern of frontal and posterior brain activation (e.g. Barceló, 2001). However, the reliability of such specific analysis is unclear, confounded by the difficulties inherent to the measurement of fast-paced cognitive processes, using relatively slower brain imaging techniques (Barceló, 2001). When global performance upon the WCST has been reviewed, it has been recognised that intact dorsolateral pre-frontal function is necessary for successful completion (Barceló, 2001).

Within this study the 'Total Correct' score was used which is derived from the number of correct responses minus incorrect responses. Total Correct was deemed to be a sufficient indicator of overall performance, thus reflective of dorsolateral prefrontal cortex abilities (Axelrod et al., 1996). To achieve a total score, the participant is required to complete each of the 128 trials. This process has been criticised for being too lengthy and frustrating for severely impaired patients (Sherer, Nick, Millis & Novack, 2003). The presence of the researcher during each assessment was therefore essential, to provide support for participants through validation of the difficulty of this test.

Studies with psychiatric in-patients have found no performance differences upon administration of computerised and manual versions of

the WCST (e.g. Hellman Green, Kern, & Christenson, 1992). However, more recent research comparing computerised and manual versions of the WCST, have identified that for 'total correct', although mean scores and variances are relatively equivalent, parallel-forms reliability is low. This would indicate that scores obtained on the two versions of the WCST cannot be used interchangeably. The same computerised version of the WCST was used throughout this study.

Comparative to control samples, the WCST has been used to identify frontal lobe impairment in patients with frontal lesions (Heaton et al., 1993), as well as patients with psychiatric diagnoses, including schizophrenia (Van der Does & Van den Bosch, 1992). The WCST was also selected due to the wide range of normative total scores which are available. These reflect the performance of patients with localised as well as diffuse brain injury, which would enable more specific identification of impairments which might be found within the study population.

2.8.1.1. Reliability and Validity of the WCST

One of the strengths of the WCST is its evidence of good validity. Construct validity can be understood as the degree to which a scale correlates with the construct it is developed to measure. Perrine (1993) found that the WSCT showed moderate correlations with the Halstead Category Test (Reitan & Wolfson, 1985), which is designed to assess problem-solving capacities, including the ability to search for and discover alternative solutions to novel problems. Concurrent validity is the degree to which the WCST correlates with other established measures of frontal lobe function, when administered at the same point in time. Shute & Huertas (1990) evidenced concurrent validity between WCST perseverative errors and a measure of Piagetian formal operational reasoning ability. Bell, Greig, Kaplan and Bryson (1997) explored the factor structure of the WCST, revealing three factors; perseveration, non-perseverate error and inefficient sorting, which displayed significant factorial invariance.

Reliability of administration was enhanced through use of Heaton's (1981) instructional script, with all default settings being used. The

researcher met the minimum standards for conducting examination, having experience in psychological testing, training in Clinical Psychology and supervision from a qualified Consultant Clinical Psychologist with specialist study in neuropsychology. Scoring reliability, although being found to be good for the manual delivery of the WCST (Axelrod et al., 1996), was enhanced through use of the computer scoring program (Harris, 1990), which employs procedures outlined by Heaton (1981).

Despite the widespread use of the WCST across forensic populations, potential links between WCST performance and violent behaviour have not been specifically examined. Instead, WCST performance has been explored in relation to real-world competencies such as daily functioning and work performance. Lysaker, Bell and Beam-Goulet (1995) found that better WCST performance was related to higher levels of work function for a group of patients with a diagnosis of schizophrenia who were completing voluntary work placements (e.g. computerised data entry, laundry tasks). More correct responses on the WCST were found to predict higher Task Orientation ratings, which provided a measure of participants' basic abilities to understand their work duties and to independently remain focussed on these tasks. In addition, fewer total errors during WCST performance were found to predict better social skills at work. This led to the suggestion that frontal lobe impairment could negatively impact upon an individual's ability to socialise appropriately within the workplace; leading to a difficulty in forming positive relationships with co-workers.

A further study by Little, Templer, Persel and Ashley (1996) examined WCST performance following head injury. Individuals producing fewer erroneous responses and completing more categories were more likely to return to work and master tasks enabling independent living. With regard to participants post-injury functioning, the predictive validity of the neuropsychological assessments was found to be better than that of post-injury tests of intelligence.

These findings evidence an association between poorer WCST performance and impairments in aspects of some individual's daily, social

and occupational functioning. Despite the lack of attention to the meaning of WCST impairments for forensic populations, these areas of functioning receive considerable attention within the schizophrenia rehabilitation literature (Burns & Patrick, 2007). In addition, factors such as employment history or relationship stability have shown associations with violence risk (e.g. Wong & Gordon, 1999). Examination of WCST performance in relation to violent behaviour would be a beneficial expansion of the violence risk evidence base, particularly as impaired WCST performance has been identified across a range of violent forensic populations (e.g. Krakowski & Czobor, 1997; Broomhall, 2005).

2.8.2. Iowa Gambling Task (IGT; Bechara et al., 1994).

The IGT was developed to assess specific deficits in the medial orbitofrontal and ventromedial regions of the frontal cortex, which have been implicated within the process of emotional decision-making (Bechara et al., 1994). Although these deficits were found to be identifiable through patient's abnormal decision-making, they were not routinely detected by other neuropsychological tests. For example, patients have displayed intact performance on the WCST, but impaired performance on the IGT (e.g. Ritter et al., 2004), leading to the inclusion of both of these measures within the current study.

The somatic marker hypothesis is proposed to underpin performance on the IGT task (Damasio, Tranel & Damasio, 1991). 'Somatic markers' are perceived to be instances of feelings which are generated from secondary emotions. These feelings and emotions have been connected through learning during past experiences, giving rise to future predicted outcomes within specific situations. Whilst a positive marker, may function as an incentive, one that is negative may be experienced as an 'alarm bell'. These are viewed to be emotion-related signals, operating at both conscious and unconscious levels, which assist an individual to make advantageous decisions (Bechara, Damasio, Tranel & Damasio, 2005). The Somatic Marker hypothesis states that patients with ventromedial prefrontal cortex lesions exhibit poor performance on the IGT, due to the absence of these markers (Bechara et al., 1994).

Patient with ventromedial prefrontal cortex lesions have been found to switch away from bad decks following a loss, however subsequently returning to disadvantageous decks sooner and more often than control participants (Bechara et al., 1994). This process of 'strategy reversal' appears to be guided by the most recent outcome, rather past learning experience (Busemeyer & Stout, 2002).

Both the somatic marker hypothesis and the IGT have been subject to some critique. Impaired performance upon the IGT has been shown not only for patients with ventromedial prefrontal cortex lesions, but also for patients with lesions in dorsolateral prefrontal regions. This has raised questions regarding the specificity of the IGT, in relation to the specific identification of ventromedial prefrontal cortex damage (Maia & McClelland, 2004). However, further studies have shown that poor performance upon the IGT by patients with dorsolateral prefrontal cortex lesions appears to be more closely related to other cognitive deficits (e.g. working memory; Fellows & Farah, 2005). The IGT has been used extensively across clinical and research studies with a range of neuropsychological and psychiatric patient populations. Within these contexts, it has been shown to be a highly sensitive measure of impaired decision-making (Bechara, 2007). The use of the IGT has also been extended more recently through its application to forensic populations (Bass, 2010).

The Net Total score was the variable of interest within this study, forming the most global appraisal of functioning within the ventromedial prefrontal cortex. This score results from the deduction of disadvantageous selections from the number of advantageous selections, thus a higher score represents more advantageous decision-making. Although the average time for administration reported within the IGT manual is 10-15 minutes, one study of healthy control adults found that administration took on average twenty minutes and elicited a high failure rate (Peatfield, Turnbull, Parkinson & Intriligator, 2012). The authors hypothesised that this arose from participants becoming frustrated and/or confused by the task. It was therefore essential within this study, to ensure that the researcher was present to support and validate the efforts

of participants during IGT performance. Clinical classifications based upon a participant's NET total score are also available for diagnostic purposes (impaired, below average and unimpaired) and these were reviewed within the current study. Default settings of the computerised IGT were maintained with the exception of changing of \$ to £, due to the greater relevance and familiarity of this currency for participants within this study.

2.8.2.1. Reliability and Validity of IGT

No studies to date, have directly examined the reliability of the IGT. Therefore, potential practice effects may impact upon subsequent administrations (Buelow & Suhr, 2009). Learning effects have been identified within populations of adolescent and adult normal controls, following a second administration of the IGT, after a one week period (Ernst et al., 2003). Therefore, the reliability of the IGT over time is unknown, which is a considerable weakness within the evidence base. It was clarified that no participants within the Mental Health Directorate had completed the IGT assessment prior to this study.

The construct validity of the IGT is evidenced through moderate correlations between the latter block scores on the IGT and perseverative errors on the WCST, another measure of executive function which shows good construct validity (Brand, Recknor, Grabenhorst & Bechara, 2007). Supportive of the validity of the IGT as a measure of activity in the prefrontal cortex, functional neuroimaging studies show increased activation in the orbitofrontal cortex during IGT completion (Adinoff et al., 2003). Discriminant validity of the IGT is evidenced through non-significant correlations with measures of general intellectual abilities, such as the National Adult Reading Test (NART; Nelson & Willison, 1982) or Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). It was felt important to appraise the ecological validity of the IGT, as Bechara (2007) proposes this task mimics the uncertainty of real-life decision-making, being "carried out in real-time with real-world contingencies" (p.2). It was found that some studies do suggest a link between IGT performance and real-world clinically relevant risky behaviours (e.g. substance use disorders; Buelow & Suhr, 2009). No

differences have been evidenced between the manual and computerised version of the IGT (Bechara, Tranel & Damasio, 2000) and scoring reliability was maximised through the use of the computerised scoring software within this study.

There is an absence of information regarding the ecological validity of performance on the IGT in relation to violent behaviour; likely due to the fact that the IGT has only recently been applied within forensic contexts. However, significant correlations have been found between impaired IGT performance and poor decision-making within other clinical populations. The IGT has been used to show decision-making deficits in patients with substance use disorders. Verdejo-Garcia, Bechara, Recknor & Perez-Garcia (2006) found that a number of aspects of real-life functioning, associated with addiction severity, were moderately predictive of IGT performance, including severe medical, employment, family, social and legal problems. These findings supported the notion of a positive correlation between decision-making deficits, as measured by the IGT and the real-life negative consequences of addiction in individuals with a substance use disorder.

IGT performance has also been explored in relation to eating disorder populations. Boeka and Lokken (2006) assessed IGT performance in relation to decision-making ability of patients with bulimia nervosa. Despite negative health and psychosocial consequences, sufferers engage in persistent chaotic feeding behaviour (i.e., bingeing and purging). Boeka & Lokken (2006) proposed that the cycle of immediate short-term gratification seen within bulimia nervosa, despite the negative long-term consequences, could reflect impairments in decision-making. Following administration of the IGT, it was found that the 20 females with a diagnosis of bulimia nervosa performed significantly worse than 20 age-matched females with minimal bulimic symptoms (control group). Performance on the IGT was found to be negatively correlated with bulimic symptomology, predicting performance even after control of demographic variables and depressive symptoms. The IGT has also been administered with individuals with anorexia nervosa. Tchanturia et al.

(2007) found that performance on the IGT was significantly poorer for anorexic patients comparative to recovered anorexic patients and healthy controls. The authors proposed that these findings support the notion that decision-making is impaired in anorexic patients.

Overall, these findings evidence the utility of the IGT for the identification of decision-making impairments within other clinical populations. The current study therefore sets out to assess whether orbitofrontal decision-making deficits may also be present within a population of violent offenders within this High Secure Hospital setting.

2.9. Rationale for assessment of anger

Within the instrumental-reactive dichotomy, instrumental violent offending is characterised by the absence of affect. In contrast, affect is perceived to be a central motivating factor to the reactive violent offender (Fontaine, 2007). Anger, is the emotion most commonly referred to within the reactive typology (Scarpa & Raine, 2000). Anger has also received the most theoretical attention in relation to its connection to frontal lobe functioning, which is also proposed to differ between the instrumental and reactive classifications (Raine, Stoddard, Bihle & Buchsbaum, 1998). These factors underpin the focus upon anger within the context of this study.

2.9.1. State Trait Anger Expression Index-2 (STAXI-2; Spielberger, 1999).

The STAXI-2 was selected in preference to other validated anger measures, such as the Novaco Anger Scale (NAS; Novaco, 1994), due to its ability to capture the individual's experience of anger in specific depth. Unlike the NAS, the STAXI-2 enables inspection of experience, expression and control. It further delineates between internal and external behavioural consequences of this experience (Spielberger, 1999). The state anger scale, which represents the intensity of angry feelings and extent of desire to express anger at a particular time, was the only STAXI-2 scale which was not administered within the current study. Descriptions of the trait anger scale and Anger Expression Index scale, which were

used within this study, are provided within the journal paper. From these two scales, two specific indices were selected for analysis.

The Anger Expression Index (AX-In.) was used to provide a general measure of an individual's angry feelings (Spielberger, 1999). A high AX-In. score indicates that an individual frequently experiences intense angry feelings; however it does not reflect whether these feelings are expressed, suppressed or both. Therefore, the Anger Control-Out (AC-O) index was also recruited, to provide a measure of how much an individual controls their angry feelings, preventing their expression towards others or external objects. The selection of these anger indices within the current study was influenced by Megargee's (1966) recognition of over-controlled and under-controlled anger presentations, within a sample of violent offenders. Although these individuals might both frequently experience intense anger, their expression and control of these experiences are observably quite different. Review of AX-In. alone would not distinguish between these profiles. However, for a meaningful interpretation of anger control, it is necessary to consider an individual's general level of anger experience. It was hypothesised that the combination of these scales would lead to a more accurate interpretation of anger profiles.

A critique of the STAXI-2 relates to the self-report nature of this assessment and its vulnerability to socially desirable responding. McEwan, Davis, MacKenzie and Mullen (2009) studied the effects of impression management upon responses to the STAXI-2. They found that individuals who engaged in impression management reported significantly lower levels of trait anger, outward anger expression and inward anger expression, in addition to higher levels of anger control. Therefore, within this study, to minimise the influence of the researcher's presence upon participant's responses, the researcher remained as physically remote as possible from the participant whilst they completed the STAXI-2.

2.9.1.1. Reliability and Validity of STAXI-2

The STAXI-2 has evidenced good reliability and validity. The STAXI-2 trait anger scale has shown concurrent validity with the related concept of hostility, evidenced through significant correlations with the Buss-

Durkee Hostility Inventory total score (BHDH; Buss & Durkee, 1957) and hostility sub-scale of the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1967). Subsequent factor analysis also revealed appropriate divergent validity between these tools. The Trait-Anger scale had its highest loading upon the Anger factor, whilst the BHDH and MMPI had their highest loadings upon the Hostility factor (Bechara, 2007). Good internal consistency has been found for the AX-In. and AC-O indices used within this study, upon comparison of normative scores between a heterogeneous community sample and hospitalised psychiatric patients. Within this study, scoring reliability was enhanced through the use of computerised scoring software, which conducted the calculation of each index score.

The STAXI and STAXI-2 have been widely used in the examination of links between anger and physical health problems. High anger experience and expression, as well as low anger control, have been linked to problems such as coronary heart disease (e.g. Bishop & Quah, 1998), elevated blood pressure and hypotension (e.g. Everson, Goldberg, Kaplan, Julkunen & Salonen, 1998). High anger expression index scores have also been associated to psychological difficulties, such as depression (e.g. Tschannen, Duckro, Margolis & Tomazic, 1992).

With regard to violent populations, the STAXI-2 has been used extensively with perpetrators of domestic violence; with elevated levels of anger being identified as a distinguishing feature of intimate partner violence (Norlander & Eckhardt, 2005). In particular, a pattern of higher trait anger and lower anger control is reported by domestically violent males, comparative to normal controls (Eckhardt, Jamison & Watts, 2002). With regard to other violent populations, the STAXI assessment measures have been used to identify higher levels of anger experience and expression in violent male offenders across a range of forensic settings. Mills and Kroner (2003) found a significant positive correlation between STAXI anger-out sub-scale scores and number of prior assault convictions in both male and female offenders being held in custody. In addition, Mela et al. (2008) used the STAXI to evaluate outcomes following an anger management programme completed by 285 male

offenders, detained within a prison setting. Following the intervention, a significant reduction was seen in trait anger and anger expression index scores, as measured by the STAXI. Furthermore, anger-related institutional offending, which included assaults and verbal threats, also decreased during the two year follow-up period. Further research of this nature is required to establish the predictive validity of the STAXI-2 with regard to anger-related violence in other forensic populations, particularly as previous studies have highlighted the predictive value of anger among offenders with Major Mental Illness (Novaco, 1994, 1997). In addition, any research utilising the STAXI must be replicated using the STAXI-2, to improve the specific reliability and validity evidence base for this latest version of the tool.

2.10. Rationale for violence risk assessment

Current assessments of community violence are not available for patients detained within the High Secure context and static violence risk histories, although found to be a good predictors of future violence (Wong & Gordon, 2006), are unresponsive to changes in risk over time or as a consequence of treatment. Therefore, a proxy measure of violence risk incorporating static and dynamic markers of risk was used within the current study.

2.10.1. Violence Risk Scale (VRS; Wong & Gordon, 1999).

Within this study, the VRS was selected as a predictive judgement of community violence risk over a number of other tools. Alternative recidivism tools such as the General Statistical Information of Recidivism Scale (GSIR; Nuffield, 1982) or Level of Service Inventory-Revised (LSI-R; Andrews & Bonta, 2000) constitute predictors of general criminal recidivism, with no specificity for violence. The Violent Risk Appraisal Guide (VRAG; Quinsey, Harris, Rice & Cormier, 1998) has been found to have better predictive validity when applied to Personality Disordered, rather than MMI populations. This has been attributed to the VRAG's high reliance upon static variables, which lacks intra-individual sensitivity within an MMI high-risk population (Grann, Belfrage & Tengström, 2000). The HCR-20 version 2 (Webster, Douglas, Eaves & Hart, 1997), a general

assessment guide, is also suggested to be less sensitive to risk state, with a large number of static items, making it poorly predictive of violence (De Vogel & De Ruiter, 2006). Alternatively, the Psychopathy Checklist-Revised (PCL-R, Hare, 1999) has shown positive outcomes for prediction of violent recidivism, based upon levels of psychopathy (Tengström, Grann, Långström & Kullgren, 2000). The VRS shows comparable predictive validity to the PCL-R (Wong & Gordon, 1999), whilst also having a number of strengths which were perceived to be of value to the current study.

The VRS was developed specifically for the prediction of violent recidivism. Its 20 dynamic risk variables have been found to be particularly helpful with regard to violence risk treatment planning (Wong & Gordon, 2000). Although the VRS's large number of dynamic variables may be seen to improve sensitivity to detection of risk, Rogers (2000) has warned against the assumption of additivity, without examination of multi-collinearity. However, The VRS manual (Wong & Gordon, 1999) provides a literature review and rationale for the inclusion of each variable, as well as guidance for the scoring of each item and advice relating to "guarding against rating biases" (p.17).

As is seen within the VRS, sole focus upon violence risk factors has been highlighted as a common problem across many risk assessments (Sheldrick, 1999). Plutchik (1995) suggested that any appraisal of risk should also include attention to protective factors, such as social relations, religious beliefs or self-esteem. Laub and Lauritsen (1994) emphasised that it is the inclusion of both risk and protective factors which provides the most balanced evaluation of risk. The VRS however, does attempt to acknowledge protective factors with variables rated two or three deemed to be significant violence risk markers and appropriate treatment targets, whilst those rated zero are perceived to be areas of strength. However, Rogers (2000) challenges this concept of an absent risk factor as a protective factor. Although the VRS suggests a score of zero to be an area of strength, can strength really be seen for example, in the absence of mental illness; when there is no specific evidence that the absence of mental illness actually reduces risk? However, zero ratings upon other

dynamic variables, such as community support, are more closely aligned with protective factors. Inspection of the many items within the VRS further highlights the absence of moderator effects (variables which affect the strength and direction of the relationship between predictor and criterion variables), which for example may include; gender or number of treatment sessions (Baron & Kenny, 1986).

One unique aspect of the VRS which does relate to the context of treatment is its Stages of Change Model. This assists with the focus and planning of treatment, as well as facilitating sensitivity to treatment change. Scores upon each dynamic item can be reduced by 0.5 as an individual's behaviour is modified, reflecting their progression through a number of stages. Stages are defined as; Pre-contemplation, Contemplation, Preparation, Action and Maintenance, with relapse considered a commonality (Prochaska et al., 1992). No reduction in score is given from progression between Pre-contemplation and Contemplation, as this is considered absent of behavioural change. However, progression from Contemplation to Preparation, would give rise to a reduction of 0.5 upon each dynamic variable for which this change in stage was perceived to be applicable. The greatest possible reduction upon each dynamic item arising from the Stage of Change calculation is therefore 1.5, reflecting progression from Contemplation to Maintenance. This Stages of Change model has been validated within numerous treatment studies (e.g. domestic violence, Prochaska, DeClemente & Norcross, 1992) and unlike many other violence risk assessment tools, provides a means by which the influence of mediating effects, such as clinical interventions, can be seen upon violence risk scale score.

When calculating VRS total score, static and dynamic item scores are added together, providing all items have been rated. However, it may sometimes be necessary to omit items, if they are non-applicable to a case, or available information is insufficient to rate the item. For example, in accordance with rating instructions produced by Wong & Gordon (1999), dynamic item 15, 'Released to High Risk Situations', should be omitted if the individual has no foreseeable release possibility in the next three years. This omission may be relevant for a large number of

individuals, particularly within the High Secure context. When calculating the VRS total score, when one or more items have been omitted, a pro-rated score must be calculated. This is obtained through the addition of available static and dynamic scores and multiplication of this value by the total number of items in the VRS. This new value is then divided by the number of items that were rated (i.e. 26 minus the number of omitted factors).

Low, medium and high risk categories have been created based upon VRS total scores. However, these have raised a number of criticisms, including concerns surrounding their predictive accuracy for violent recidivism. Rogers (2000) highlights that base rates for different levels of violence should be established within specific clinical and forensic settings. Therefore, one limitation in the use of the VRS within the current study, relates to the absence of violence base rates for males with Major Mental Illness within the High Secure hospital setting. This led to the review of base rates for other male forensic populations.

The first predictive study using the VRS was conducted by Wong & Gordon (2006) with a group of 571 male offenders. Recidivism rates were established at one-year, two-year and three-year follow up, based upon low, medium and high risk categories (See Table 4). Smaller follow-up periods, such as one year, give rise to more accurate base rates for the assessment of current violence risk, whilst those drawn from longer follow-up periods, such as three or more years, may serve to artificially increase base rates, reducing their applicability to those who are perceived to be imminently dangerous (Rosenfeld, 1999). Therefore, caution must be taken when using longer term follow-up data to predict an individual's current risk of violence. In addition, Wong & Gordon's (2006) participants scored low on the 'mental illness' dynamic variable, therefore not being directly comparable to participants within the current study. However, risk factors and risk measures which are predictive in forensic samples have also been found to be predictive in acute mental health populations (Doyle, Carter, Shaw & Dolan, 2012).

Table 4: Violence Risk Scale Categories and associated percentages of violent reconvictions

Risk Category	N1	Violent reconvictions (%)
High >50	321	51.1
Medium >35 to ≥50	299	32.8
Low ≥ 35	298	8.4
<i>Total</i>	918	31.3

Note: N1= Number of participants in normative sample at 52.80 months mean follow-up time (4.4 years; CI=50.15-55.5)

Review of actual violent recidivism rates for 'high risk' patients, which would be the expected comparative sample for participants within the current study, shows limitations to the predictive accuracy of the VRS tool. Within this high risk category only 51.1% actually violently re-offended (Wong & Gordon, 2006). It is however, possible that the authors' sole focus upon official convictions might have led to the under-representation of violent recidivism within this study. Wong and Gordon (2006) conducted Receiver Operating Characteristic analysis, which displayed that the Area under the curve for violent re-convictions over one year (N =847), two year (N =758) and three year (N =571) follow-up were .73, .74 and .72 respectively. These are equivalent rates to rates seen for the predictive validity of other well validated instruments (e.g. PCL-R; Dolan & Doyle, 2000). Although this may be considered to be an optimum rate, issues relating to sensitivity (true positive rate) and specificity (true negative rate) of the VRS, mean that its 'real-world' predictive rate is likely to be significantly weaker (Szmukler, 2001).

A study by Wong and Parhar (2011) has also assessed the validity of the VRS ratings in predicting recidivism, in a sample of 60 federal offenders residing in the community after conditional release. Participants were categorised into high (N=12), medium (N=14) and low (N=34) VRS grouping and at seven year follow-up, approximately 75% of those deemed to be high risk, 43% of those deemed to be medium risk and 18% of those deemed to be low risk were reconvicted for a violent

offence. Although these results seem more promising, this study was limited due to a small sample size and a particularly long follow-up period.

Another difficulty attributed to these risk groupings relates to the substantial score reduction which is required to move between risk categories (Wong & Gordon, 2006). Significant heterogeneity in risk score can therefore be seen between individuals at the upper and lower group limits. However, only one percentage estimate of violent recidivism is associated to the risk grouping and therefore attributed to both individuals. In response, Wong & Gordon (2006) started to investigate the validity of using a 5 point bandwidth of VRS total score (e.g. 35-40; 45-50) for prediction of violent recidivism. They identified that for every unit (5-point) decrease in VRS total score, an approximately equal proportional decrease in actual violent recidivism was seen (4.99%). Within this study, zero risk of violent recidivism was found to be reflective of VRS total scores within the 10-15 point range, also raising questions as to the clinical utility of low, medium and high categories. Although smaller band widths could more accurately reflect treatment change, these categories require further assessment and validation.

Although the predictive validity of the VRS has been found to be moderate (Wong & Gordon, 2006), it could still contribute something to the process of clinical decision-making. Wong & Parhar (2011) demonstrated that had the VRS been applied at the end of the Canadian National Parole Board's decision-making process, releasing only those assessed by the VRS as low or medium risk, the number of violent re-offenders would have reduced from 21 to 12, a 42.9% reduction. Although the predictive validity of the VRS alone might be modest, its use alongside clinical decision-making could be beneficial.

The VRS is already used within the High Secure hospital context in which the study was conducted. A VRS total score of over 45 is one of the inclusion criteria for the Violent Offender Treatment Programme. Pre and post treatment VRS scores are also used as a measure of treatment change (Braham, Jones & Hollin, 2008). Alongside other risk measures

and clinical judgment, the VRS is used to make decisions relating to patient admission, progression and discharge.

A six month expiration date was placed upon the VRS assessment within this study. This was influenced by previous research conducted by Skeem et al. (2006), which evidenced the predictive validity of anger, with regard to commission of community violence, over a 26 week period. All VRS assessments held on file within this study had been completed by a formally trained VRS assessor who is a member of the Violent Offender Treatment team. These assessments are conducted as part of routine clinical practice. Each VRS assessment is independently rated by two assessors and discussions are conducted within the Violent Offender Treatment team, until agreement is reached upon a consensus score. The VRS assessment can then be inserted into patient files and referred to within clinical reports. Consistent with VRS scoring guidance, items were omitted in the current study if they could not be scored due to insufficient information or irrelevancy to the individual. In such cases, an adjusted calculation of the Total Score was performed, guided by the assessment manual (Wong & Gordon, 2000). Low, medium and high risk categories for VRS total score were not used within the current study due to the expected skew toward high risk scores within this participant group.

2.10.1.1. Reliability and Validity of the VRS

The VRS has shown good concurrent validity with the Psychopathy Checklist-Revised (PCL-R, Hare 1999) and is well validated in its prediction of violent recidivism (Wong & Gordon, 2006). It has been specifically validated for use with patients with Major Mental Illness (e.g. Braham et al., 2010) and it has evidenced the ability to accurately discriminate between high-risk patients, predicting violent and non-violent recidivism over one to four year follow-up (de Vries Robbe, Weenick & de Vogel, 2006). More specifically, VRS total scores have been found to correlate significantly with violent recidivism in a group of 47 patients with Major Mental Illness (Wong & Gordon, 2000). High inter-rater reliability has been evidenced (Wong & Parhar, 2011) and VRS total score exhibits good internal consistency (Wong & Gordon, 2000).

2.11. Rationale for Data Analysis

Within this study analysis and interpretation of group data, rather than individual data, was conducted. It is recognised that this process leads to a reduction in sensitivity to individual variability. However, group interventions play a significant role in the treatment of High Secure hospital patients (Stein & Brown, 1991). Therefore, identification of common violence risk variables could assist with their development.

3.0. Extended Results

This section of the extended paper outlines additional analyses which were conducted, yet beyond the scope of report within the journal paper. These pertain to examination of the integrity of the data, as well as checking assumptions inherent to conduction of parametric correlational analysis and multivariate regression analysis. Several texts were used to support this process including Field (2009), Pallant (2007), as well as Tabachnick and Fidell (2001).

3.1. Preliminary Data Review

No missing data was present in the final data set. The use of computerised assessments minimised the risks of missing data, as participants were required to respond to each component in order to progress. In addition, computation errors were avoided through use of computer generated scoring systems. The data set was checked upon three separate occasions to assess for inputting errors and none were evident.

3.2. Normally Distributed Data

Normal distribution of the data was examined using visual and statistical methods. Boxplots and Histograms were reviewed to assess for outliers, which hold potential to unduly influence subsequent correlational and regression analyses. No outliers were explicitly identified from each of the variable boxplots. However, the dependent variable, VRS total score, showed distinct negative skew in its lower whisker. Upon review of Histograms, again with regard to VRS total score, participant 11,

appeared to be a potential outlier. As concern was evident, statistical assessments of distribution and normality were further consulted.

Table 5: Statistical Assessment of Normal Distribution

Variable	Skewness	Z- Skew	Kurtosis	Shapiro-Wilk	Sig.*
VRS Total Score	-0.443	-1.18	-0.266	0.95	0.079
WCST Total Score	-0.254	-0.67	0.210	0.967	0.278
IGT Net Total	0.434	1.16	-0.166	0.960	0.163
Anger Control Out	-.170	-0.45	-1.042	0.961	0.188
Anger Expression Index	0.12	0.32	-.0.711	0.957	0.127

*Note: Z-Skew = Standardised z-scores for skewness, Sig = Significance value of Shapiro-Wilk calculation, * = Non-significance indicates that the variable does not violate normal distribution*

The Shapiro-Wilk calculation for VRS score, although not meeting the criterion of significance at the $p < 0.05$ level, was particularly close to this significance threshold. Standardised z-scores were then calculated for further inspection. Due to the relatively small sample size, a threshold of ± 2.5 was employed, suggested by Field (2009). One data point, again participant 11, was found to exceed this criterion, having a z-score of -2.70. This data point was examined, with no error in inputting being confirmed. This participant had a VRS score which was not only significantly lower than the other participants, but quite uncharacteristic of this High Secure population. As the participant was unreflective of this population, with potential to influence the subsequent analyses, participant 11's data was excluded listwise from further analysis ($N=39$).

3.3. Sample Distribution

Participants were recruited from seven different wards, within which an individual's placement, broadly reflects their progress through their treatment pathway. Wards consisted of two admission wards, two treatment wards, one high intensity ward and three rehabilitation wards.

Table 6: Participant numbers, VRS score range and mean, for each ward

Ward	N.	Participants' VRS Score Range	Participants' Mean VRS Score
Admission 1	6	38 - 68.64	50.57
Admission 2	7	46.8 - 69	58.59
Treatment 1	5	38.48 - 65.6	52.1
Treatment 2	8	37.44 - 70.42	60.29
Rehabilitation 1	1	-	56
Rehabilitation 2	5	32.24 - 53.5	42.43
Mixed Physical Health & Rehabilitation	6	32.24 - 63.34	49.48
High Intensity	1	-	45.76

Table note: N. = number of participants

Only one participant was recruited from the high intensity ward, which likely reflects the small number of individuals on this ward, who were identified as suitable to approach by their Responsible Clinician (N=3). However, relatively equivalent numbers of participants were recruited from the two admission (N=13) and two treatment (N=13) wards. Mean VRS scores across admission and treatment wards were reflective of a high-risk VRS category rating (>50).

Compared with those on treatment wards, individuals based within the mixed physical health-rehabilitation ward are typically further along in their treatment pathway and are deemed to require a lower level of security. For this reason, the mixed ward was grouped with the other two rehabilitation wards for analysis of sample distribution. The mean VRS total scores for rehabilitation ward two and the mixed ward, were reflective of medium risk category ratings on the VRS (35>50). However, the single participant recruited from rehabilitation ward one, had a comparatively higher VRS total score. Although it cannot be established whether the VRS total score for this participant was reflective of the whole

ward population, it is tentatively suggested that this participant's score may be more closely aligned to the upper threshold of the ward population, rather than the ward mean score. This is proposed due to the fact that patients within rehabilitation wards are nearing the end of their High-Secure treatment pathway. These findings indicate that sample recruitment was relatively well distributed across the treatment pathway. The Kruskal-Wallis test was used to compare the distribution of VRS scores between the admission (N=13), treatment (N=13) and rehabilitation wards (N=12). No significant difference was found with regard to the distribution of scores between the three ward groups ($p = .09$); therefore supporting the comparability of these groups and collapsing of these groups for the purpose of analysis.

3.4. Inter-rater reliability

The two-way random effects model was used within the current study as two raters independently rated the same cases. The random effects model was used as these two raters were drawn from a wider population of raters and the aim of this sub-group reliability analysis was to generalise these results to the wider participant population. The very high inter-rater reliability for VRS total score, which was seen within the current study, is not uncommon. De Vries, Weenink and de Vogel (2006) found the single measure inter-rater reliability for VRS total score to be 0.88, upon examination of data from three assessors independently coding 20 cases. Within the current study, all ratings were made following a review of each detailed item description provided within the VRS manual. This is a method of scoring which has been found to result in very high levels of inter-rater reliability (Wong & Gordon, 2000). Using this method, Doyle, Carter, Shaw and Dolan (2012) found that between three assessors rating seven cases, the single measure inter-rater reliability for VRS total score was 0.96. Another factor which may have contributed to the high inter-rater reliability within the current study, may relate to the fact that the researcher also had considerable previous experience of scoring VRS assessments across a range of forensic settings.

3.5. Interpretations of performance on the dependent and independent variables

3.5.1. Wisconsin Card Sorting Test (Heaton et al., 1993)

Participants' mean score for WCST total was compared against all available comparative population scores. Participants' mean score was found to be closest to the mean score exhibited by patients with lesions specific to the frontal lobes (see Table 7). Comparative to the frontal lobe lesion patient group, the participants' score was slightly higher, with a smaller deviation from the mean. Within the current study, 20 participants had scores which were equal to or lower than the mean score of patients with frontal lobe lesions. A further 4 participants' total scores were reflective of the mean scores for patients with different profiles of impairment (i.e. frontal plus lesions, non-frontal lesions and diffuse impairment). Finally, the WSCT total score of 15 participants was reflective of the mean score associated with normal controls.

Table 7: WCST total correct mean scores and standard deviations for study population, comparative to lesion groups and normative controls (taken from Heaton et al., 1993).

Total correct	Study population (n=39)	Frontal (n=59)	Frontal Plus (n=53)	Diffuse (n=177)	Non-frontal (n=54)	Normal (n=356)
Mean	65.05	64.59	67.72	66.50	67.76	68.81
Standard Deviation	13.15	18.79	14.10	16.72	14.52	10.85

Note: n = number of participants;

Frontal = Refers to patients with lesions specific to the frontal lobe

3.5.2. Iowa Gambling Task (Bechara et al., 1994)

As the IGT failed to correlate significantly with the WCST, further inspection of performance was conducted. Participants' performance was explored in relation to the IGT's categorical cut-off scores (see Table 8).

Of the participant sample, 65% scored below the 50% percentile when compared to a normative sample aged 18-39 years, with education less than 12 years. In total, 82% achieved a score less than 40 being classified as impaired (32 of 39). Only one participant fell within a borderline category which would typically lead to inspection of block scores, therefore reflecting appropriate use of the IGT Total score within this study.

Table 8: Participant's scores and comparative norms according to diagnostic categories (Bechara et al., 1994)

Clinical Classification	Net Score Range	% predicted from a normal distribution	Number in participant sample (% of participants)
Impaired Range	0-39	14.6	32 (82.05%)
Below Average Range	40-44	14.4	1 (2.56%)
Non-impaired Range	≥45	71	6 (15.38%)

3.5.3. State Trait Anger Expression Inventory (Spielberger, 1999)

A high AX-In. score can have different meanings dependent upon variations in expression and control, both internally and externally. As such, further analysis was conducted to ascertain what a higher AX-In. score, significantly correlating with higher violence risk score, represented within this population. Consultation of the correlation matrix revealed a significant positive correlation between AX-In. and Trait Anger ($r = .430$; $p < .01$), as well as Trait Angry Temperament ($r = .585$; $p < .01$) and Trait Angry Reactions ($r = .416$; $p < .01$). Significant and positive associations were also evident with Anger Expression-Out ($r = .566$; $p < .01$) and Anger Expression-In ($r = .347$; $p < .05$). With regard to Anger Control, the AX-In. was found to correlate significantly and negatively with Anger Control-In ($r = -.677$; $p < 0.01$) and AC-O ($r = -.798$; $p < .01$). Interpretation of these correlations revealed a profile of high anger experience, expression and low control within this sample.

Participants' scores upon the AX-In. and AC-O indices were examined in relation to normative adults and psychiatric patients (see Table 9). Participants' mean score on the AX-In. was slightly lower than the mean score for the psychiatric sample; however these were not significantly different. Distribution of scores around the mean for these two groups was very similar. However, a significant difference was seen upon comparison to the normative population, who displayed a much lower mean and smaller variation in scores.

Participants' mean score for AC-O was slightly higher than the psychiatric population sample, but again this difference was not significant. However, significantly less variation in scores around the mean was evident for the psychiatric patients compared with the participant group. In comparison to the scores achieved by normal adults, participants mean score for AC-O was slightly lower and their distribution of scores was greater.

Table 9: Mean scores and standard deviations for AX-In. and AC-O for study population, psychiatric patients and normal adults (taken from Spielberger, 1999)

Scale	Study Population			Psychiatric patients			Normal adults		
	N	Mean	Standard Deviation	N	Mean	Standard Deviation	N	Mean	Standard Deviation
STAX I AX-In.	39	37.88	13.86	170	39.58	13.96	657	16.35	3.99
STAX I AC-O	39	21.65	6.23	164	21.06	0.23	667	23.53	5.01

Note: N = Number of participants

3.5.4. Violence Risk Scale (Wong & Gordon, 1999)

Upon analysis of the participants VRS total scores, 23 (59%) were found to fall within the high-risk category. This skew towards the high-risk classification was expected within the High Secure context. A further 14 participants VRS total scores fell within the medium-risk category, perhaps reflecting the variation within this participant sample, with regard to length of detention and subsequent opportunity for treatment. Perhaps

more surprisingly within this High Secure context, the VRS total scores of two participants fell within the low risk category.

Table 10: Participants according to VRS risk category and associated predictive violent reconviction rates according to Wong & Gordon (2006)

Number of participants	Risk Category	Violent reconvictions (%)
23	High >50	51.1
14	Medium >35 to ≥50	32.8
2	Low ≥ 35	8.4
39	<i>Total</i>	31.3

Note: N= Number of participants in the current study meeting the specified risk category

3.6. Post-Hoc Analyses

3.6.1. WCST performance and VRS total scores

A post-hoc comparative analysis was conducted to investigate the hypothesis that participants who were impaired on the WCST (N=24) would have higher VRS total scores than those who achieved a total score equivalent to the mean for a control population (N= 15). Due to the differences in numbers of participants within each group, a Mann-Whitney U test was conducted. The results of the test were not statistically significant ($p = .236$), indicating that there was no significant difference between the two groups with regard to the average VRS total. The impaired group had an average rank of 21.21 and the unimpaired group had an average rank of 17.27.

3.6.2. IGT performance and VRS total scores

A post hoc analysis was conducted to explore the hypothesis that VRS total scores would be significantly lower for those who were unimpaired upon the IGT (N=6), compared with those who were impaired upon the IGT (N=33). Due to the differences in numbers of participants within each group, a Mann-Whitney U test was conducted. The results of the test were not statistically significant ($p = .785$), indicating that there was no significant difference between the average VRS scores for the two

groups. The average rank was 19.79 for the impaired group and the average rank was 21.17 for the unimpaired group.

3.6.3. Sensitivity analysis

Following inspection of the dynamic variables of the VRS, potential for double measurement error was identified. It was noted that the variable emotional control, which relates to the identification of problematic over or under-control of emotions, may for some participants, be rated in relation to their anger control. If this were the case, this produces potential for overlap with the independent variable of anger control. In addition, further potential for double measurement was identified between the frontal lobe measures and the VRS dynamic variable of impulsivity, which may be rated in relation to the behavioural phenotypes of frontal dysfunction. Therefore separate sensitivity analyses were conducted for the removal of the VRS dynamic variables of impulsivity and emotional control. The VRS dynamic score was calculated when one of these variables was removed and the resulting adjusted score was entered into a new pro-rated calculation.

Table 11: Summary of bivariate correlations with VRS dynamic variables removed

VRS	WCST	IGT	AX-In	AC-O
Emotional control removed	-.341*	-.126	.427**	-.459**
Impulsivity removed	-.348*	-.124	.429**	-.460**
Total score (all variables)	-.332*	-.125	.429**	-.457**

*Note: * Correlation is significant at the 0.05 level (2-tailed) **.*
Correlation is significant at the 0.01 level (2-tailed)

Sensitivity analyses revealed very small variations and in one case no variation, upon removal of the emotional control and impulsivity variables. This confirms the significant findings of the primary analysis,

therefore demonstrating the robustness of the original outcomes. These findings may be explained by the fact that the emotional control VRS dynamic variable does not specify anger and instead may be rated in terms of a range of emotions (e.g. anxiety symptoms or behaviours). In addition, rating of the impulsivity VRS dynamic variable is characteristic of an individual's observable mode of behaviour, rather than a direct measure of an individual's internal cognitive competencies.

3.6.4. Independent Analysis of VRS static and dynamic items

As treatment focus is based upon dynamic items of risk assessment tools, rather than static items, further post-hoc exploratory analysis was conducted to assess how each of the independent variables correlated with the static, as well as dynamic items of the VRS.

Table 12: Descriptive Statistics for participants VRS static and dynamic scores

VRS items	Potential score range	Minimum	Maximum	Mean	Standard Deviation
Static	0-18	1	16	10.08	3.83
Dynamic	0-60	28	55	40.67	8.13
Total	0-78	32.24	70.42	53.26	11.72

VRS total scores were seen to vary across the participant sample. Further analysis revealed the greatest variation between participants' scores for the 20 dynamic items, with less disparity seen across the six static items. The variability in these scores provides support for the sensitivity of the VRS in detecting inter-individual variations within this 'high-risk' patient population. Bivariate correlational analysis was also repeated, to assess the strength of correlations between each of the independent variables, in relation to VRS static and dynamic scores.

Table 13: Summary of correlations between the independent variables and VRS static as well as dynamic scores

VRS	WCST	IGT	AX-In	AC-O
Static	-.127	-.159	.305	-.328*
Dynamic	-.424**	-.069	.434**	-.448**
Total	-.332*	-.125	.429**	-.457**

*Note: * Correlation is significant at the 0.05 level (2-tailed) **, Correlation is significant at the 0.01 level (2-tailed)*

The WCST failed to correlate significantly with the static items of the VRS, whilst a significant correlation was seen with dynamic VRS items. This correlation was found to be stronger than the correlation seen between WCST and VRS total score, as significance increased from the 0.05 to 0.01 level. IGT Net total most strongly correlated with VRS dynamic items and most weakly correlated with VRS static items, however all associations failed to reach statistical significance. AX-In. was found to significantly correlate with VRS dynamic items, but not static items. The combination of the static and dynamic items for VRS total score led to a slightly weaker but statistically significant correlation with AX-In. Finally, AC-O was found to significantly correlate with both static and dynamic variables of the VRS. However, the strongest correlation is seen upon the combination of static and dynamic items, to produce VRS total score. Overall, VRS static items contributed least to the associations with the independent variables. Only in the case of AC-O, did the static variables have any additive effect beyond the associations seen between the independent variables and VRS dynamic items. These findings support the use of VRS dynamic items, to assist with identifying treatment targets for individuals within this High Secure hospital context.

3.7. Testing of assumptions for Regression Analysis

Within regression analysis, the objective is not only to create a predictive model which is suited to the participant sample under study. Instead, it is more useful to assume the model to be relevant to the wider

population. However, to do this, the following underlying assumptions, which concern aspects of the data, must be met.

Variable types

The predictor variables of WCST Total, AC-O and AX-In. were quantitative, continuous and unbounded. The dependent variable, VRS, was also quantitative, continuous and unbounded. Each was deemed appropriate for entry into regression analysis.

Non-zero variance and Independence

Non-zero variance refers to the variation in value evident in the scores obtained upon each of the predictor variables. This can be confirmed by review of Table 2, within the journal paper. In addition, each dependent variable value was obtained from a different participant, thus constituting independent observations.

Multicollinearity

No perfect multicollinearity must be present within the data. This means that no two predictor variables should exhibit a linear relationship. Multicollinearity is evident through a high correlation between two predictor variables. The correlational matrix was examined revealing that the two anger variables showed a high correlation ($r = -.0798$, $p < 0.01$). This is consistent with Field's (2009) lower collinearity threshold of ($r = 0.8/0.9$). Inconsistencies in the literature, for example Tabachnick and Fidell's (2001), criterion of $p \leq 0.9$, could have led to the rejection of collinearity. However, appreciation of the conceptual underpinnings of the AX-In. led to the adoption of Field's (2009) more stringent threshold. The AX-In. is derived from the combination of scores upon the Anger Expression-Out, Anger Expression-In, Anger Control-In and AC-O subscales, the overlap in measurement between AX-In. and AC-O making the high correlation between these variables understandable.

This decision to adopt the more stringent collinearity criteria was evidenced through post-hoc examination of multicollinearity diagnostics. These revealed that AX-In. had a Condition Index of 28.26, in excess of

Field's (2009) threshold of 15, which he defines as indicative of predictor variable dependency. Ax-In. possessed a very low Eigenvalue (.005), coupled with two variance proportions in excess of 0.5. This reflected a high overlap between the variance accounted for by the variables AX-In and AC-O. within this regression model. Consultation of coefficients revealed the AX-In. to be the weaker contributor to the model of the two anger variables, contributing little to the predictive model. It was therefore removed from the final regression analysis.

Normality, Linearity and Homoscedasticity

The two predictor variables WCST Total and AC-O were entered into the final regression model alongside the dependent variable VRS total score. Subsequent regression plots were examined. Normality assumes that the residuals in the regression plot are random, normally distributed variables with a mean of 0 (Field, 2009). Within this regression model, normality was assumed as a concentration of residuals was evident around the normal line with distribution symmetrically trailing off from the centre. Linearity refers to the values of the outcome variable. Confirmation of this assumption assumes that for each increment in the output variable, the predictor values will lie along a straight line (Field, 2009). This was apparent from the Normal P-P plot (probability plot) for this regression model, as expected normal residual values corresponded with actual residual values. Homoscedasticity states that the residuals at each level of the predictor variable should have the same variance (Field, 2009). Within the final regression model, this was confirmed from examination of the variance of the predicted VRS residuals scores.

Independent Errors

The Durbin-Watson test was employed to assess for serial correlation between errors, ensuring a lack of autocorrelation. The test statistic was 2.14, greater than the upper bound critical value (1.45) for two predictor variables and N=39, reflecting no significant autocorrelation between predictor variables.

3.8. Preliminary Regression Model

Review of the correlational matrix revealed a highly significant negative correlation between AC-O ($r = -0.798$, $p < 0.001$), at the lower end of Field's (2009) criteria for collinearity, set at $p = 0.8/0.9$. With negligible difference between the strength of association between either variable with VRS total score, a preliminary analysis was run, in which both anger variables were included within a preliminary regression analysis.

A standard multiple regression (enter method) was performed between VRS total score as the dependent variable and WCST Total, AC-O and AX-In. as the independent variables.

Table 14: Summary of Multiple Regression Statistics for predictor variables

<i>Dependent Variable = VRS total score</i>			
Predictor Variable	B	SEB	β
WCST total Score	-.269	.130	-.302
Anger Control-Out	-.750	.442	-.404
Anger Expression Index	.039	.203	.047
<i>Note: B = Unstandardised coefficient, SE B = Standard Error of B, β = Standardised beta coefficient.</i>			
<i>R² = .305, F(3, 35) = 5.624, p = .005</i>			

A significant model was produced $F(3,35) = 5.305$, $p = 0.005$. Altogether, 30.5% (Adjusted 24.5 %) of the variability in VRS total score was predicted by WCST total score, AC-O and AX-In. However, collinearity diagnostics confirmed shared variance between AC-O and AX-In. Review of zero order and partial correlations revealed that AX-In. was the weakest contributor to the predictive model, its co-efficient falling short of statistical significance. As such, the AX-In. was removed and the regression analysis re-run. The outcomes of this final analysis are detailed within the journal paper.

4.0 Extended Discussion

4.1. Frontal Lobe Deficits

4.1.1. *Complexities in frontal lobe assessment*

The difficulty of attributing specific frontal lobe abilities to completion of particular assessment tools is acknowledged. However, previous studies employing neuropsychological assessment batteries, spanning a wide-range of cognitive functions, have yielded relatively disparate profiles of impairment (e.g. Joyce & Rosier, 2007). It was therefore deemed necessary within the current study, to employ increased specificity of focus upon frontal lobe functions. However, even this term incorporates multiple skills and abilities. The WCST and the IGT were selected due to their relevance to assessment of learning and decision-making. This specific inspection of frontal lobe deficits, relating to a smaller breadth of competencies, assisted to reveal a significant profile of deficit within this population. This holds implications for future neuropsychological risk marker research, in that focus should be specific and assessment tools should show strength in their sensitivity to the construct under measurement.

4.1.2. Impairments relating to the IGT and WCST

The participants within the current study evidenced impairments on the WCST, which corresponded to the performance of patients with dorsolateral prefrontal lesions (Ritter et al., 2004). Fellows and Farah (2005) have identified that such patients can also show poor performance on the IGT, which they believe to be more reflective of working memory deficits, rather than impairments in the ventromedial prefrontal or orbitofrontal cortex, which the IGT is proposed to reflect. However, within the current study, more participants were impaired upon the IGT, than the WCST. These results would imply that failure upon the IGT could not be explained purely by the presence of working memory deficits within the context of dorsolateral prefrontal impairment. This instead would suggest, that results upon these frontal lobe assessments could be related to impairments within the frontal lobe regions specified to each task. Future

research within this population might benefit from the additional assessment of working memory, in order to clarify its association to performance upon these tasks. This research should also use the computerised versions of these assessments if valid comparisons to the current study are to be drawn.

4.1.3. Frontal Lobe Assessment Screening

WCST scores evidenced frontal lobe deficits relating to reasoning, planning, organisation and problem-solving. Similarly, IGT scores showed that 32 of 39 participants were below the threshold for low decision-making capacity. This reflects that for a substantial number of patients within this High Secure MMI population, frontal lobe deficits are a prominent feature, thus a significant clinical need. In response to this, clinicians require a means by which, patients with such deficits can be identified. This could be facilitated through development of a frontal lobe deficit screening battery, which could be administered as part of routine assessment upon admission. A screening tool, rather than a full neuropsychological assessment, would reduce costs, as well as demands upon patients and clinicians, at a time which is typically an intensive assessment period. Recognition of such difficulties and consideration of these within treatment planning could have substantial clinical gains. If interventions for frontal lobe impairments are delivered at the first opportunity, any benefit gained from these could have positive implications for subsequent interventions. It is also suggested that frontal lobe abilities are re-screened to assess whether an individual's treatment gains are sustained or whether further intervention is required. The frequency of these re-assessments could be mapped onto the Care Programme Approach (Department of Health, 2008), when broad appraisals of progression and outstanding treatment needs are already conducted.

4.1.4. Skills-based treatment programmes

With regard to frontal lobe deficits, once identified through screening, patients may benefit from a more comprehensive appraisal of need. The frontal lobes are responsible for a diverse number of skills. For

example, deficits in the dorsolateral prefrontal cortex can result in a range of difficulties spanning; affect, executive memory, abstract reasoning, intentionality and social judgement (Zelazo & Müller, 2002). Identification of patient's specific areas of treatment need would enhance the sensitivity of subsequent treatment interventions. Empirical evidence already confirms the utility of a number of treatment programmes including, Reasoning and Rehabilitation (Ross et al., 1988), Cognitive Remediation Therapy (Wykes & Reeder, 2005) or Planning and Problem-solving Training (Rodewald et al., 2011). These improvements in frontal lobe functioning might elicit widespread benefits with regard to treatment outcomes. In addition, any beneficial effects to these rehabilitation programmes could be hypothesised to lead to reductions in judgements relating to impulsivity, interpersonal aggression or stability of relationships on the VRS. Future research is therefore essential to assess the nature and extent of these potential treatment gains.

4.1.5. Frontal lobe deficits and existing treatment programmes

Although studies have found some participants to be responsive to treatments such as Cognitive Remediation Therapy, with WCST performance being returned to normative levels (Wykes et al., 2007), such gains are not comparative across all participants. Frontal lobe deficits may therefore not be fully resolved for some participants. In addition, an individual's degree of impairment in reasoning, planning and decision-making, might fluctuate based upon symptoms levels or specific medications. Frontal lobe abilities might therefore show some inter-individual and intra-individual variation. As the impact of medication and symptoms cannot always be reduced, review and revision of existing treatment programmes is also proposed. Small adaptations such as scaffolding of information and repetition of tasks could prove to be highly beneficial to patients with residual frontal lobe impairments (e.g. Young & Freyslinger, 1995). These changes could further assist those who, although functioning above the threshold for referral to cognitive rehabilitation treatments, still demonstrate some learning impairments which require support. These adaptations could lead to lower treatment attrition rates and better patient outcomes, negating future re-enrolment.

4.2. Frontal Lobe Deficits and Anger

Although no significant associations were identified between the frontal lobe measures and anger variables within the current study, these findings do not negate an association between these constructs. As highlighted within the journal paper, these results may have arisen due to measurement insensitivity and this could perhaps be increased through measurement of how differing levels of anger arousal effect performance on the frontal lobe tasks. In addition, it is also possible that a more indirect relationship exists between these two variables. For example, in the current study, deficits in frontal lobe abilities have been hypothesised to have potential negative implications for participants' treatment outcomes, which could include anger interventions. Therefore, interventions which are shown to improve frontal lobe functioning could also be examined in relation to whether positive effects are seen with regard to an individual's reported and observed anger control. Further investigation is required due to the poverty of research examining the potential interaction between these constructs.

4.3. Anger and Violence

4.3.1. Representation of over and under-controlled anger presentations

Although participants' scores for outward anger control were only slightly lower than those achieved by the control population, a recognised limitation of the STAXI-2 related to the fact that participants may favourably respond to questionnaire items (McEwan et al., 2009). Therefore, outward anger control could potentially be a greater treatment need for these participants than is indicated by the STAXI-2 responses. However, poorer anger control is evident from the current results and its combination with significantly higher levels of anger expression, appears consistent with Megargee's (1966) conception of the under-controlled angry individual. Over-controlled angry individuals were under-represented within the current study. Future studies may therefore aim to sample equally across over controlled and under-controlled individuals,

enabling the investigation of how the association between anger and violence differs in relation to these two classifications of angry individuals.

4.3.2. Absence of direct analysis of violent behaviour

The strong association between anger and violence risk judgements might indicate that participants within the current study are at particular risk of reactive violence. However, as no direct analysis of participants' violence was conducted, this hypothesis requires further investigation. This could be achieved through a future follow-up study; however within the context of a High Secure population, this process would take a considerable number of years with relatively few patients being directly released from this setting. One alternative would therefore be the review of anger in relation to historical violence, which would facilitate the assessment of whether anger has been present within the context of these participants' previous violence. In addition, it would allow for exploration of whether anger was experienced as a negative affective state, consistent with the reactive violence typology (Berkowitz, 1993), or whether some participants experienced anger positively, leading to an escalation in their violence, as proposed by Howard et al. (2008).

Section 4.3.3. Anger as an on-going treatment need

Within the current study, it would appear that only a small improvement in outward anger control scores is required for participants to achieve scores which are equivalent to the normative control population. However, a number of factors must be considered. Firstly, a limitation of the STAXI-2 relates to its vulnerability to socially desirable responding. Of particular relevance to the current study, McEwan et al. (2009) found that socially desirable responding led to elevated reports of outward anger control. Therefore, within the current study, the levels of anger control reported by participants might under-estimate the extent of impairment within this population. Participants also reported higher anger experience than normal controls. This would suggest that intense experiences of anger are more frequent for these participants, placing recurrent demands upon anger control. As such, even this small degree of poor anger control could have significant negative implications for

behaviour. Lapses in anger control could potentially lead to a range of inappropriate behavioural responses, including violence. Within the current study anger expression and control are identified as significant and on-going treatment needs for these participants; which to date have not been addressed by previous interventions for problematic anger or violence.

4.3.4. *Anger Treatments*

Although meta-analytic reviews of adult anger treatments reveal significant and moderate treatment gains (e.g. DiGuiseppe, & Tafrate, 2003), this study evidences that difficulty in anger expression and outward anger control persists, despite many participants anecdotal report of historical completion of anger interventions. Details relating to participants' attendance or completion of specific anger interventions were not gathered within the current study, however this information would be beneficial to consider within future research.

It is recognised that treatment outcomes for individuals may vary due to fluctuations in symptoms, motivation and engagement (Novaco, 2011); however, for participants within the current study, the presence of frontal lobe deficits offers a further hypothesis as to why previous anger treatments have not been successful. These impairments are also important to consider within the context of future interventions for anger. The common treatment framework for anger is cognitive behavioural therapy (Novaco, 2011). Empirically based techniques are employed including cognitive restructuring, skills training and relaxation (Fuller, DiGiuseppe, O'Leary, Fountain & Lang, 2010). For participants within the current study, the sustainability of cognitive restructuring techniques could be questionable in the context of their problematic planning, organisation and reasoning skills. However, the results of the current study indicate that rehabilitating outward anger control could be particularly helpful with regard to the reduction of violence risk. This could be achieved through teaching behavioural control strategies, rather than using cognitive techniques. These might include distraction and relaxation

techniques which reduce the urge to express angry feelings, stopping an individual from losing their temper.

Anger treatment with the current study setting is delivered on a group basis, only when a specific need for anger management is identified. As identified as a more general weakness of anger interventions, (e.g. Beck & Fernandez, 1998), the anger programme within the current setting is more consistent with the treatment needs of under-controlled angry individuals (L. Braham, personal communication, November, 23, 2011). Although this would suite most participants within the current study, the specific needs of over-controlled angry individuals would not be met. Further research is therefore required to establish what treatment needs might be specific to those who are over-controlled and how these can be integrated into current anger treatments. Assessment of anger interventions delivered within this context, should further be evaluated on their ability to reduce violence risk judgements. These evaluations could perhaps prove to be more reflective of community behaviour, given the recognition of significant differences across in-patient and community contexts (Harris & Rice, 2003).

4.3.5. Extension of the current evidence base

The required improvement in AC-O score could be hypothesised to be an achievable target within the context of a well validated anger intervention (e.g. Jones & Hollin, 2004). However, it would first be beneficial for future research to establish the specific aspects of anger treatment which could best address this difficulty. In addition, the degree to outward anger control can be improved through treatment should be explored, as well as the degree to which violence risk judgements may reduce in response to such treatments. Improved anger control could be hypothesised to result in more favourable clinical judgements upon a number of VRS dynamic variables such as, emotional control, violence within the institution, or impulsivity. However, the validity of such hypotheses could only be established upon the appraisal of future research outcomes.

Previous violence risk research within the in-patient setting has applied multiple anger and hostility measures, exploring their relationship to violent convictions (e.g. Loza & Loza-Fanous, 1999). The specific inspection of the anger expression and outward anger control indices, in relation to dynamic predictive violence risk judgements, enabled replication of the association between anger and violence which has been strongly supported within community studies (e.g. Monahan et al., 2001; Skeem et al., 2006). The findings of this study support the use of dynamic and proximal measurements, when investigating anger in relation to predictive judgements of community violence risk, for patients within the High Secure context.

4.4. Predictor variables and violence risk judgements

4.4.1. *Refining violence risk research*

Although the current predictive model appears weak in its account of only 30.4% of the variability in violence risk scale scores, the significance of these findings to this population becomes clear upon appraisal of the wider violence risk assessment literature. The largest predictive study of violence risk, conducted with patients with MMI, was the MacArthur Violence Risk Assessment Study (Monahan et al., 2001). 1,136 participants were recruited and 134 personal, historical, clinical and situational factors, all of which having shown a significant associations with violence within previous research, were assessed. Of these, 70 variables had a statistically significant relationship with violence committed after community release (Monahan et al., 2001). Therefore, the identification of two variables which account for 30.4% of the variance in violence risk judgements for these participants could be suggested to be greater than would have been expected.

Within the current study, a one point improvement in WCST total scores predicted a reduction in violence risk judgements of 0.3 for these participants. Although the contribution of WCST score to the model was the lesser of the two variables, significant changes in WCST scores have been seen to arise for some patients following treatment (e.g. Wykes et al., 2007). When combined with AC-O which contributed 0.83 to the

predictive model, the potential for a 1.1 unit decrease in VRS total score is seen. Although a 1.1 unit decrease in VRS total is modest in isolation, reductions in VRS score have also been seen for many patients following completion of other treatments within this setting (e.g. Violence Offender Treatment programme within this setting, Braham, Jones & Hollin, 2008). Therefore, the current model offers the opportunity for a unique and significant contribution to assist towards the reduction of violence risk judgements for these participants. Wong & Gordon (2006) have also evidenced that even a 5 point reduction in VRS total score, can for some patients, give rise to a near to equivalent reduction in violent recidivism (4.99%). It is acknowledged that this 5 point interval model requires further investigation; however these findings highlight the fact that even a small change upon a predictive violent risk assessment measure can equate to a substantial change in violent behaviour.

4.4.2. Predictive study within the in-patient context

The benefit of large community predictive studies is acknowledged as they provide a breadth of information relating to violence risk factors. However, research similar to the current study enables the examination of variables which are specific to the population, being not only theoretically, but contextually relevant. Within the Mac Aurther Violence Risk Assessment Study (Monahan et al., 2001) a diagnosis of schizophrenia was negatively associated with violence at follow-up. However this is a common diagnosis within the current participant group, who possess violence histories and are deemed to pose a high risk of further violence. In addition, other variables found to be predictive of violence, such as neighbourhood (Monahan et al., 2001), are not relevant to the current in-patient setting. The current predictive model therefore provides a significant contribution to understanding what variables are predictive of violence risk judgements for participants within this particular setting. However, further research is required as there remain a number of variables which would be hypothesised to be relevant (e.g. command hallucinations, Braham, Trower & Birchwood, 2004), however were beyond the scope of simultaneous assessment within this study. These investigations could assist in the development and subsequent provision

of more comprehensive assessments, treatments, as well as risk predictions for these participants.

This study also highlights the need for progression beyond simple identification of deficits within MMI populations, in the consideration of violence risk prediction. The empirical evidence base recognises the presence of frontal lobe impairments with regard to reasoning, planning, organisation and problem-solving in violent forensic groups (e.g. Blake, Pincus & Buckner, 1995). However, the extent of such deficits has been found to vary based upon the degree of violence shown by a patient (e.g. Krakowski & Czobor, 1997). With regard to the study of anger substantial research focus has fallen upon the measurement of trait anger (Spielberger, 1999), which has been found to be high within violent populations across community (e.g. Skeem et al., 2006) and High Secure contexts (Watt & Howells, 2010). However, as it cannot be presumed that frequent and intense experience of anger always leads to violent behaviour (Averill, 1982); generic findings of high trait anger in violent populations, offers little value to violence risk assessment, treatment or prediction. Of greater relevance is the interaction of appropriate expression and control, within the context of high trait anger and exploration of how these factors are associated with violence. However, what is absent from these evidence bases, particularly within the context of in-patient study, is the assessment of whether such deficits are predictive of violence risk judgements. This has been established within the current study and with considerable implications for treatment, it is recommended that future research should, as a minimum standard, also set out to establish the predictive validity of the violence risk variables that it seeks to assess.

4.5. Strengths, Limitations and Future Research

4.5.1. *Conceptual Issues*

Across the research fields of executive functions, anger and violence, many authors fail to explicitly define the constructs which underpin the clinical variables subjected to measurement. This results in a lack of conceptual clarity for the reader and upon systematic appraisal of

the evidence base, exclusion of potentially relevant studies. In many cases, this may also give rise to poor methodological rigour, resulting in use of assessment tools which fail to measure the intended construct (e.g. Skeem et al., 2006), or the application of multiple assessments, with little or no rationale provided for their use (e.g. Loza & Loza-Fanous, 1999). Within this study, each construct under investigation was clearly defined, subsequently providing the basis upon which the assessment measures were selected. This enhances potential for replication and generalisation of findings, therefore being a clear strength of this study. Should this rigor be sustained within future research, not only would more consistent findings be elicited, but poor conceptual clarity across the current research fields could also be resolved.

4.5.2. Dynamic risk appraisals

This research highlights the need for clinicians to conduct assessment of predictor variables and violence risk on a frequent basis. Anger is seen as a dynamic variable and the frontal lobes do not mature until the early 20's (Bechara, 2007). Therefore on-going change can be inherent to any patient group. The WCST (Heaton et al., 1993), STAXI-2 (Spielberger, 1999) and VRS (Wong & Gordon, 2006) have all been evidenced to be sensitive clinical tools for dynamic assessment and prediction of violence risk within an MMI High Secure patient sample.

4.5.3. Study with hard-to-reach populations

In accordance with the a-priori sample size calculation, this study failed to recruit the 43 participants deemed necessary to achieve a medium effect size. However, despite only 39 participants' data being entered into the regression analysis, a total of 40 participants were initially recruited, reflecting a 33.6% uptake rate. The exclusion criteria compounded what was an already limited sample size. However, this was essential to maintaining methodological rigor and preventing participant distress. Sampling problems are a recognised difficulty of conducting research with 'hard-to-reach' populations such as this (Abrams, 2010). The potential for poor recruitment within this context was considered in the planning of this research, leading to specificity in focus upon only two

constructs, in the context of numerous potential, as well as recognised, violence risk markers. Conducting in-patient research in this manner holds implications for future violence risk research. Studies within the UK, wishing to concurrently assess a greater number of violence risk markers, would require recruitment across all three High Secure hospital sites. This is due to the nature of UK High Secure institutions, which typically give rise to smaller patient groups, than would be found within community settings.

4.5.4. Assessment Language

One limitation related specifically to the complexity of the vocabulary employed within the STAXI-2 (Spielberger, 1999). Two statements in particular required clarification by the researcher. The first was question 31, which used the term 'apt'. Several participants requested an alternative to this word, which the researcher provided as 'able'. Statement 44 contained the term 'endeavour', also leading to requests for alternative vocabulary. The word 'try' was used as a replacement. Adaptations such as this might be necessary within future research and should be kept to a minimum to maintain the validity of the assessment.

4.5.5. Future research

In addition to the future research proposals within the journal paper, it would be beneficial to use the VRS within predictive violence studies with patient populations. Establishing predictive violent recidivism rates for violent patient populations would enhance the specificity of this tool to the participants within the current study. Follow-up studies of this nature would benefit not only from establishing predictive violent recidivism rates based upon low, medium and high risk categories, but also the 5 point intervals developed by Wong & Gordon (2006). These smaller risk categories would have much greater relevance for evaluating treatment outcomes for patients with MMI within the High Secure hospital context.

5.0. Ethical Issues

Although pre-conceived costs to patients were outlined within the Participant Information Sheet, one unaccounted factor emerged during conduction of this study. Patients who showed significant deficits on the WCST were subject to notification each time that their answers were wrong. This caused some distress and frustration for a number of patients. Distress was minimised by the researcher offering reassurance that the task was difficult and upon task completion, the efforts of the participant were validated by the researcher. No participants refused to continue with the assessment battery and any distress appeared to diminish over the course of the session. If participants reported or appeared to be frustrated by the assessment process, yet rejected the opportunity for further support, this was documented briefly on the electronic clinical notes system and verbally conveyed to the nursing team.

The frontal lobe assessments used within this study do not provide an exhaustive appraisal of frontal lobe or wider cognitive abilities. Therefore a lack of impairment upon these frontal lobe measures does not negate the presence of other frontal or cognitive deficits which must also be assessed. In addition, deficits in both WCST performance and outward anger control are not isolated predictor variables of violence risk judgements within this setting and they should be rehabilitated alongside other treatment targets. Clinical decisions also yield significant information about a patient's functioning and risk. Behaviour observable to clinicians may be beyond the scope of these self-report and computerised assessments, the results of which can be affected by lapses in memory and/ or attention. Therefore integration of clinical judgements when conducting these assessments is vital.

Although this study indicated a need for routine screening for frontal lobe deficits in patient populations, prior to treatment planning, training should be provided to all assessors, ensuring minimum standards of knowledge and practice relating to neuropsychological assessment. As development of these screening procedures and adaption of existent

programmes would take time, it is cautioned not to preclude or delay those with frontal lobe deficits from accessing routine treatments; instead providing adequate support until adaptations of existing programmes are complete.

6.0. Critical Reflective Component

As clinical, theoretical, scientific and ethical issues raised by research have been discussed, this reflective component will focus predominantly upon the process of conducting this research.

The initial stages of recruitment coincided with a popular holiday period. A number of Responsible Clinicians were therefore unavailable due to leave, delaying commencement of recruitment. Following the 12 months of preparation prior to entering the hospital, this heightened anxieties over whether the study could be completed within the planned time-scale. This also likely impacted upon the experience of participant recruitment. Although understanding patients' decisions not to participate, particularly within the context of on-going intensive hospital assessment and treatment programmes, it was difficult to escape the sense of disappointment when large numbers of patients' consecutively declined participation. This impacted upon on-going concerns regarding sample size, within this already limited population. These fears persisted into the latter weeks of data collection, as the exhaustion of the potential sample neared. It is within this final recruitment period, that significant participant engagement was achieved.

The approach of patients by the researcher alone was time-consuming. Yet, this systematic recruitment was beneficial as the researcher was external to the clinical team. It enabled patients to gain familiarity with the assessor, having potential to reduce anxieties which could impact upon assessment performance. However, in instances in which a researcher is an existent clinical team member, subsequent to a comprehensive briefing from the prime researcher, recruitment could be dispersed amongst clinical team members. This would substantially reduce the time taken for recruitment. The process of assessment could also be

disseminated amongst the clinical team, as long as minimal training and qualification standards are ensured.

During the assessment process computerised feedback gave participants awareness of their performance, leading to some negative self-appraisals. At these times emotional support was provided by the researcher, however assistance in correct completion of the task was not. This was a distress that had not been recognised within the planning stages of this study. In future research it is recommended that note of this potential distress be made with the Participant Information Sheet.

Despite these challenges, reflection upon the potential utility of these findings for future treatment undoubtedly made this process worthwhile. In particular, personal appreciation of the strengths and limitations of research, as well as clinical perspectives of violence risk assessment and prediction has developed. This in turn will inform future working practices with forensic populations.

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Appendices

Appendix I: Ethical Approval – University of Lincoln

Appendix II: Ethical Approval – Nottingham Research Ethics Committee 1

Appendix III: Ethical Approval - Research Management and Governance

Appendix IV: Responsible Clinician Information Sheet

Appendix V: Participant Information Sheet

Appendix VI: Participant Consent Form

Appendix VII: VRS static and dynamic variables

Appendix VIII: International Journal of Forensic Mental Health, Instructions to authors

Portfolio Appendix I

APPROVAL: UNIVERSITY OF LINCOLN

RE: University Ethics submission

Emile van der Zee

To: Anne M Ohanlon (09160566)

Cc:

Thanks for this info Ann. I've just checked things on-line and with a colleague.

This is to confirm that you have ethical approval from today. Good luck with your research, all my best,

Emile

Emile van der Zee PhD

Principal Lecturer in Psychology

Coordinator MSc in Child Studies

Department of Psychology

University of Lincoln

Lincoln LN6 7TS

evanderzee@lincoln.ac.uk

<http://www.lincoln.ac.uk/psychology/staff/683.asp>

Portfolio Appendix II



National Research Ethics Service

Nottingham Research Ethics Committee 1

The Old Chapel
Royal Standard Place
Nottingham
NG1 6FS

Telephone: 0115 8839368
Facsimile: 0115 9123300

27 October 2010

Miss Anne-Marie O'Hanlon
Trainee Clinical Psychologist
Lincolnshire Partnership Foundation Trust
Department of Clinical Psychology
Village Hall, 2nd Floor, Room VH2005
University of Lincoln, Brayford Pool
LN6 7TS

Dear Miss O'Hanlon

Study Title: Neuropsychological deficits and anger experience as violence risk markers in mentally disordered offenders**
Please note that the term 'mentally disordered offender' is used by professionals within legal and forensic settings to describe a patient who has had contact with both Mental Health Services and the Criminal Justice System.

REC reference number: 10/H0403/82

Thank you for your letter which we received on 19th October 2010, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

This Research Ethics Committee is an advisory committee to East Midlands Strategic Health Authority
The National Research Ethics Service (NRES) represents the NRES Directorate within the
National Patient Safety Agency and Research Ethics Committees in England

WPH 1370

Portfolio Appendix III

positive

Nottinghamshire Healthcare 
NHS Trust

Positive about mental health and learning disability

Research Management and Governance
Institute of Mental Health
2nd Floor, Duncan MacMillan House
Porchester Road
Nottingham

E-mail: emma.pearson@nottshc.nhs.uk
Direct Line: ext 10661 / 10663

Tel: 0115 969 1300

Date: 18th November 2010

Miss Anne-Marie O'Hanlan
Lincolnshire Partnership Foundation Trust
Department of Clinical Psychology
Village Hall, 2nd floor, room VH2005
Brayford Pool
LN6 7TS

Dear Miss O'Hanlan

I am writing to confirm that the following study is authorised to take place within our Trust:

Title: Neuropsychological deficits, anger and violent risk in MDO's

Organisation /directorate(s): Rampton Hospital - Mental Health Services

Start Date: 18/11/10 **End Date:** 18/11/11

Outline:

The research seeks to assess a group of patients who are diagnosed with a major mental illness and have been in contact with the Criminal Justice System and transferred to a UK special hospital for treatment. It sets out to identify whether patients who are deemed to be of a higher risk of violent offending than most, as determined by an interview based risk assessment, show distinct differences in the following two areas: firstly, whether there are deficits in the action of the frontal lobes of the brain which are important in decision making and well as control of emotion and behaviour and secondly the frequency and intensity in which these patient experience anger and the control they have over such emotions.

Each participant will be expected to be involved in the study for no longer than 4 weeks which will involve 1 session of 35 min to administer the neuropsychological test and a maximum of 3 further 1 hour sessions where the participant will undertake a number of activities including:

- 1) State-Trait Anger Expression Inventory
- 2) Wisconsin Card Sorting Task
- 3) Iowa Gambling Task
- 4) Violence Risk Scale

Participants may become distressed during the activities to address this, the nursing staff and the RC have agreed that should a participant need additional support during or after the interview this can be provided. All interviews will take place within an interview room within Rampton Hospital.

Approval is dependent on a number of conditions, which are listed at the end of this letter.

In accordance with the Research Governance framework, The Trust RMG Department will request a progress update to assess its impact and influence on practice and policy. You will

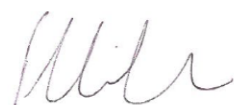
receive a brief progress report form to complete every six months from the start of your study which will provide you with the opportunity to inform us of any problems or concerns that you may have. We will also request a short summary of your research findings once the study is complete to assist in the dissemination process within the Trust

You can now proceed with your study in accordance with the agreed protocol. Please keep this letter with you during the course of your research to confirm that you have Directorate and RMG Department approval, to gain access to the areas where your research is taking place.

If you or others have concerns please contact the RMG department on 0115 9691300 ext 10661 or by email to emma.pearson@nottshc.nhs.uk

We wish you well with your work.

Yours sincerely



Dr Peter Miller
Medical Director
Nottinghamshire Healthcare NHS Trust

Conditions of Trust approval are as follows.

1. All members of the research team should familiarise themselves with all relevant policies and procedures, including the Trust policy GG/CG/04 – staff conducting, hosting or collaborating in research (note, currently being revised).
2. The Chief Investigator, and all other members of the research team, should comply with any regulations applicable to the study, including, but not limited to: The NHS Research Governance Framework for Health and Social Care (2005), The Declaration of Helsinki (2000), The UK Medicines for Human Use (Clinical Trials) Regulations (2004), ICH Good Clinical Practice guidelines (1997), The Human Tissue Act (2004), The Data Protection Act (1998), The Mental Capacity Act (2005).
3. The Chief Investigator should ensure that all members of the research team are suitably qualified and experienced, and adequately supervised. This should include training in informed consent procedures and GCP, where necessary.
4. Research governance should be notified of any major changes to the study, which may include changes to the team, requiring honorary contracts or letters of access to be issued, changes to timescales or changes in procedures.
 - a. Any changes in the protocol or documentation should be approved by the ethics committee and research governance.
5. Care professionals should be informed of their patients' participation in the research.
6. The protocol should be adhered to; any deviations should be notified to research governance.
7. Suitable arrangements for archiving should be made in accordance with the guidelines of the sponsor, and research governance should be kept informed of any changes or failures in archiving arrangements, including failures in safe preservation of electronic data. Failure to report such losses will result in disciplinary investigation of Trust staff, and a disciplinary enquiry of external researchers, which could result in the rescinding of rights to carry research in the Trust.

Portfolio Appendix IV

Responsible Clinician Information Sheet (Version 4, 15.10.2010)

Research title: Neuropsychological deficits and anger experience as violence risk markers in mentally disordered offenders

1. What is the purpose of this research?

This research is designed to look at whether problems in the action of the brain's frontal lobes contribute to how people with a diagnosis of mental illness experience anger and control offending behaviour. This research will form the thesis element of doctoral studies in Clinical Psychology and generalised findings will be presented to your teams to enhance awareness of neuropsychological difficulties experienced by some patients in the service. This could serve to inform widespread neuropsychological assessment across the unit.

2. Why have I been approached?

You have been approached as you are the Responsible Clinician for a patient based within the Mental Health Service at Rampton Hospital, who we feel may be appropriate to participate within this research. It is assumed that, as you hold responsibility for their care, you are an appropriate person to approach for identification of whether or not your patient is a suitable candidate for participation within this research. Please notify the researcher should you disagree with this statement. If you identify no reason, based upon the information provided, why your patient is not suitable to participate, then they will be approached and their participation requested. This decision should be based upon your clinical judgement as well as the inclusion/ exclusion criteria enlisted below. The grounds under which your decision is made should not be disclosed to the researcher, as this would constitute a breach of patient confidentiality.

3. Do I have to participate?

You do not have to take any part in the identification of potential participants. Your decision whether to contribute to this research is entirely voluntary.

4. What will my participation involve?

You will be asked whether, based upon the information provided within this information sheet, there is any reason why you feel your patient is not suitable or unable to participate within this research. The grounds upon which this decision has been made should not be disclosed to the researcher. Your participation in this process will be disclosed to the client only to the degree that you have identified no known reason why it would be unsuitable to request their participation within this research. Their decision whether or not to participate is completely autonomous. Although unlikely, should the case arise that your patient becomes distressed and requests support, we ask that your team be willing to assist us. The first point of support for your patient will of course be the researcher and research supervisor.

5. What are the possible disadvantages or risks of taking part?

We do not expect there to be any disadvantages to your participation. It will be made clear to potential participants through the Participant Information sheet, that you are neither requesting nor encouraging their participation. Therefore, your decision will not compromise your therapeutic relationship.

6. What are the possible benefits of taking part?

Upon completion of writing up the research, your patient will receive a general report of findings and, you, as well as the wider clinical team, will receive a PowerPoint presentation of findings. This research may benefit Rampton Hospital in the longer-term as it

could highlight a pattern of currently undetected brain injury for patients within this facility, which would identify a need for widespread screening and treatment. This research could also improve understanding of the effects of emotional and behavioural control, with regard to their relation to risk of violent recidivism. This in turn could inform current treatment programmes at Rampton, such as the Violent Offender Treatment Programme. Research findings will also be submitted for publication in a peer-reviewed journal which could benefit the wider clinical community.

7. What if something goes wrong?

If you change your mind about a patient's suitability to be approached for participation, or their participation during the research, please notify the researcher or research supervisor immediately. Withdrawal of their data is possible up until completion of the final assessment, after which point their data will remain within the dataset. Should you wish to complain about any aspect of this research, you can address concerns firstly to the researcher and if not resolved, the research supervisor.

8. Will my taking part in this study be kept confidential?

Your patient will be told only that you have advised that they are suitable to approach for participation in the research, based on having sight of the inclusion criteria which has been defined in their information sheet as being of relevant age, having no medical or health problems that would affect their ability to participate and having received no recent treatment affecting their brain activity. All patient consent forms and raw data will be stored in locked cabinet at the hospital in accordance with the Data Protection Act. These will be under the care of the research supervisor and will be destroyed after 7 years.

9. What will happen to the results of the research study?

The results will be written up and presented as part of a Clinical Psychology Doctoral thesis. Patients will receive a general summary of research findings in the form of brief written feedback and the clinical team will receive a brief presentation of the research findings. It may also be presented at academic conferences and submitted for publication in peer-reviewed academic journals. Neither you nor your patient will receive individual reports on their performance on the assessment measures and neither of you will never be personally identified.

10. Who is organising and funding the research?

The research is organised by Anne-Marie O'Hanlon, who is a Doctoral student on the Trent Clinical Psychology course, under the supervision of Dr Louise Braham. The project is funded by the East Midlands Denary.

10. Who has reviewed the study?

This research has been reviewed through the University Peer Review process and has been approved by the Chair of Lincoln University Ethics committee, Dr Emile van der Zee. It has also been submitted and approved by Nottingham 1 Research Ethics Committee.

Inclusion criteria

- Every male aged between 18-63 years detained in the Mental Health Service within Rampton secure hospital
- Currently free of substance abuse
- Able to provide informed consent

Exclusion criteria

- Advice from an Responsible Clinician that it is not medically appropriate to approach a patient to request participation
- Any patient with a diagnosed neurological condition e.g. Parkinson's disease or multiple sclerosis
- Any patient who has received electroconvulsive therapy (E.C.T) in the last 6 months
- Any patient with literacy difficulties pertaining to the English language identified by their Responsible Clinician as unable to complete the assessment battery
- Any patients who are colour blind
- Any patient who has a current or past history of gambling addiction

Assessments to be completed by participants:

State-Trait Anger-Expression Inventory

This is a self-report questionnaire measure using a likert scale. This can be completed on behalf of the patient with verbal instructions from the researcher. Therefore reading and writing abilities are not essential. Suitable for use with patients aged between 18 and 63.

Iowa Gambling Task

For completion of this assessment, basic numeracy skills are required, including knowledge of increasing and decreasing quantities of money.

Wisconsin Card Sorting Test

This requires the ability to decipher between colours; therefore participants who are colour-blind could not complete this assessment.

If you would like to see copies of these assessment tools to aid your decision, please request assistance from the Chief Investigator or Research Supervisor.

Contacts for further information:

Chief Investigator

Anne-Marie O'Hanlon
Doctorate course in Clinical Psychology
Court 11, Satellite Building 8,
University of Lincoln,
Directorate
Brayford Pool,
Lincoln, LN6 7TS
0PD.
01522 886029
09160566@students.lincoln.ac.uk
louise.braham@nottingham.ac.uk

Research Supervisor

Dr. Louise Braham
Acting Lead Psychologist
Mental Health & National
Learning Disability

Rampton Hospital, Retford
Nottinghamshire, DN22

0115 823 2201

Thank you for your time.

Participant Information Sheet (Version 4, 15.10.2010)

Study title: Study to investigate how frontal brain activity affects anger and how these relate to offending behaviour

We would like to invite you to take part in our study. Take the time to read this information sheet carefully and talk to others about it if you wish. This can be either people involved in the project (Anne-Marie O'Hanlon and Dr Louise Braham) or those who are not. Please ask if anything is unclear or if you would like more information. Contact details are at the end of the sheet.

1. What is the purpose of this study?

This study wants to find out whether problems in the action of the frontal areas of the brain affect how people with a diagnosis of mental illness experience anger and control offending behaviour. It is independent of the High Secure hospital service and will form the research part of Doctoral studies in Clinical Psychology.

2. Why have I been approached?

You have been approached as your care is provided by the Mental Health Service at Rampton Hospital. Your Responsible Clinician has looked at a description of people who are suitable to take part in this study and has identified no reason why you would be unable to take part if you wish.

3. Do I have to take part?

No. Even though your Responsible Clinician gave their permission for the researcher to ask you to take part, they are not saying you have to; this is your choice. If you do not wish to take part, this will not affect your position or treatment at Rampton Hospital in any way.

4. What will happen to me if I take part?

You will be asked to sign a consent form saying that you have read and understood this information sheet. You will then be asked to attend a session, lasting approximately 35 minutes. You will complete two computerised tasks, one card-matching task and one gambling task, both assessing decision-making; as well as a self-report questionnaire, to assess anger experience. If you have not had a Violence Risk Scale (VRS) interview in the last six months, you will be asked to attend two or three more interview sessions to complete this. This involves asking about your thoughts, feelings and past experiences and will take approximately 2.5 hours in total which will be spread over a number of days, fitting around your other activities. If a VRS interview does have to be completed during part of this research then this can be added to your clinical file, to prevent you having to repeat this assessment as part of your routine clinical care.

5. What are the possible disadvantages or risks of taking part?

We do not expect there to be any disadvantages to you taking part. Some aspects of the VRS interview involve questions about relationships with others as well as criminal history, which you might find upsetting. You can choose not to answer certain questions if you wish and you can ask for extra support from the researcher, research supervisor or a member of the staff team. If you tell the researcher any new information relating to past offences or future intentions to cause harm to yourself or others, such disclosures will fall outside of the bounds of confidentiality. In such cases, this information will be passed to your Responsible Clinician. If your Responsible Clinician is unavailable and the response is deemed to be urgent then this information will be passed to the research supervisor, who is also a member of your

clinical team. Any new information regarding past or future offences may be passed to the police.

6. What are the possible benefits of taking part?

You will receive a general report of findings when the research is written up, but you will receive no feedback of your own performance on the tasks.

7. What if something goes wrong?

If you change your mind about taking part, you can ask the researcher or research supervisor to remove your data. This is possible up until you finish the final assessment, after this point your data will not be removed. However, any findings from this study will not identify who you are. If you wish to complain about any part of this study, you can tell the researcher, research supervisor or someone from the advocacy department.

8. Will my taking part in this study be kept private?

All data collected about you during this study, can only be identified by a number not your name. The data will be stored in locked cabinets according to the Data Protection Act and consent forms stored in a separate locked cabinet. Any computerised data will be password protected. Following the research, any new VRS assessments which are completed as part of this research, will be added to your clinical files as these assessments are routinely completed and will prevent you from having to repeat the assessment unnecessarily. All other data will remain in a locked cabinet within the hospital, under the care of the research supervisor and in accordance with the hospital research policy, will be destroyed after 7 years.

9. What will happen to the results of this study?

The results will be used as part of a thesis for a Clinical Psychology Doctorate qualification. You will receive a general written summary

of findings and the clinical team will receive a short presentation. The study may also be presented at conferences and submitted for publication in journals. None of this information will identify who you are.

10. Who is organising and funding the study?

The study is being carried out by Anne-Marie O'Hanlon, who is a Doctoral student on the Trent Clinical Psychology course, under the supervision of Dr Louise Braham. The project is funded by the East Midlands Denary.

11. Who has reviewed the study?

This study has been reviewed through the University Peer Review process and has been approved by the Chair of Lincoln University Ethics committee Dr Emile van der Zee. It has also been submitted and approved by Nottingham 1 Research Ethics Committee.

Contacts for further information:

Chief Investigator

Anne-Marie O'Hanlon
Doctorate course in Clinical Psychology
Court 11, Satellite Building 8,
University of Lincoln,
Directorate
Brayford Pool,
Lincoln, LN6 7TS
OPD.
01522 886029
09160566@students.lincoln.ac.uk
louise.braham@nottingham.ac.uk

Research Supervisor

Dr. Louise Braham
Acting Lead Psychologist
Mental Health & National
Learning Disability

Rampton Hospital, Retford
Nottinghamshire, DN22

0115 823 2201

Thank you for your time.

Portfolio Appendix VI

Patient Identification Number:

PARTICIPANT CONSENT FORM (Version 4, date: 15.10.2010)

Study Title: Study to investigate the how frontal brain activity affects
anger and their relation to offending behaviour

Name of Researchers: Miss Anne-Marie O'Hanlon (*Chief Investigator*)
Dr Louise Braham (*Principle Investigator*)

Please initial box

1. I agree that I have read and understood the information sheet dated 15.10.2010 (Version 4) for the above study. I have had the chance to ask questions and have these answered.
2. I understand that taking part is voluntary and that I can ask for my information to be removed at any point up until I finish the last assessment. I know that I do not have to give a reason and my care or legal rights will not be affected. After this point I understand that my data will be included anyway.
3. I understand that any section of my hospital records may be looked at by Anne-Marie O'Hanlon (chief investigator), if this information is relevant to this study. I give permission for her to look at these records.
4. I agree that the information collected during this study can be published, but only in a way that will not identify me.
5. I agree to take part in the above study.

☐☐☐☐☐

Name of participant

Date

Signature

Name of person taking consent

Date

Signature

Portfolio Appendix VII

VRS Static and Dynamic Items of the VRS (Wong & Gordon, 2006)

Table A: Static VRS items and brief scoring criteria

Static Item	0 Rating	1 Rating	2 Rating	3 Rating
1. Current age	45 ≥ years	40–44 years	30–39 years	<30 years
2. Age at first violent conviction	30 ≥ years	20–29 years	15–19 years	<15 years
3. Number of young offender convictions	0	1	2	>2
4. Violence throughout lifespan	no history	1 incident	few incidents	Early pattern of violence
5. Prior release failures	no failures	breached once	breached twice	1 or more escapes
6. Stability of family upbringing	stable	fairly stable	More stability but still inadequate	very little stability

Table B: VRS Dynamic items and brief item descriptions

<i>Dynamic Item</i>	<i>Brief Description</i>
D1 Violent lifestyle:	Overall lifestyle is characterized by violence
D2 Criminal personality	Interpersonal and emotional attributes conducive to criminal behaviour
D3 Criminal attitudes	Does not believe in the importance of pro-social behaviour and rules
D4 Work ethic	Uses violence or other socially inappropriate ways of supporting self financially
D5 Criminal peers	Violent behaviour and negative peer influences are closely related
D6 Interpersonal aggression	Habitual use of aggression in interpersonal interactions
D7 Emotional control	Tendency to under-control or over-control emotions linked to violence
D8 Violence during institutionalization	Prone to violent behaviours during institutionalization
D9 Weapon use	Significant association between possession or use of weapons and violence
D10 Insight into violence	Poor understanding into the precipitating factors of violence
D11 Mental disorder	Strong association between mental disorder and violent behaviour
D12 Substance abuse	Substance abuse problems have been linked to violence
D13 Stability of relationships	Unable to maintain stable marital or common-law relationships
D14 Community support	Lack of positive support people, services, or plans in community
D15 Release to High Risk Situations	Offender is planning or likely to be released to situations linked to violence
D16 Violence cycle	Pattern of interpersonal, situational, and personal factors linked to violence
D17 Impulsivity	Typically does not consider relevant information before reacting
D18 Cognitive distortions	Uses distorted thinking to justify or rationalize offending behaviour
D19 Compliance with community supervision	Poor cooperation with community supervision
D20 Security level at release	Release from higher security institutions is linked to violence

INSTRUCTIONS TO AUTHORS

Aims and Scopes: *The International Journal of Forensic Mental Health* provides an international forum for disseminating research and practical developments to forensic mental health professionals. Forensic populations include both adults and youth involved in the criminal justice system, particularly mentally disordered offenders and sex offenders. The focus is on forensic issues such as criminal responsibility, competency or fitness to stand trial, risk assessment, family violence, and treatment of forensic clients. The journal reflects the international audience represented by the International Association of Forensic Mental Health Services, and articles comparing the law and/or practice in different countries are encouraged. The journal is the official publication of the International Association of Forensic Mental Health Services, and the journal is a benefit of membership.

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Book: Millman, M. (1980). *Such a pretty face*. New York: W. W. Norton.

Contribution to a Book: Hartley, J. T., & Walsh, D. A. (1980). Contemporary issues in adult development of learning. In I. W. Poon (ed.), *Ageing in the 1980s* (pp. 239-252). Washington, DC: American Psychological Association.

Illustrations. Illustrations submitted (line drawings, halftones, photos, photomicrographs, etc.) should be clean originals or digital files. Digital files are recommended for highest quality reproduction and should follow these guidelines:

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Tables and Figures. Tables and figures (illustrations) should not be embedded in the text, but should be included as separate sheets or files. A short descriptive title should appear above each table with a clear legend and any footnotes suitably identified below. All units must be included. Figures should be completely labeled, taking into account necessary size reduction. Captions should be typed, double-spaced, on a separate sheet.

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